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With complete instructions for meeting any emergency including total nuclear attack

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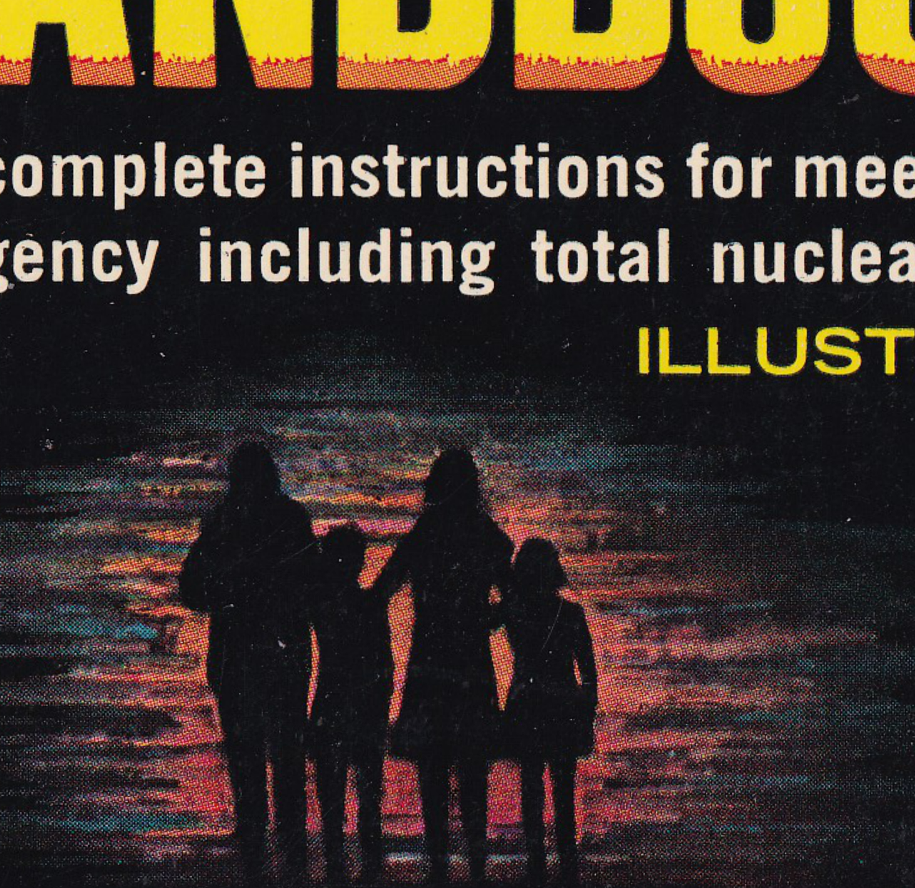

By MARTIN A. SMITH and WILLIAM E. ELIASON

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First Printing December 1961

. . . And every living substance was destroyed which was upon the face of the ground, both man and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth: and Noah only remained alive, and they that were with him in the ark.
—Genesis 7:23

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INTRODUCTION

This *Family Survival Handbook* has one single purpose: to save lives—your own life, and the lives of those dependent on you for their protection—in the event of nuclear attack.

Its intent is not to "cry havoc" nor to over-emphasize the effects, either direct or subsidiary, of nuclear warfare, but simply to present the known facts with which we will have to cope if such conditions ever arise, and to provide the best solution for each resultant problem which we may be called upon to face.

Family Survival Handbook is conceived in the belief that the American people, insistent on their right to be informed, have traditionally been best able to meet a national emergency only when they have full knowledge and understanding of that which threatens them. As soon as we know what it is all about, we proceed to do something about it. "Do-it-yourself" is really an old American custom.

We deal with an indefinite future. It would be just as wrong to face that future in the false sense of security which we might gain by slurring over any possibility of hostile attack as it would be to allow ourselves to become fixed in the idea that such an attack will come, and that there is nothing that can be done about it.

Family Survival Handbook not only identifies the potential dangers with which we may be faced, but tells what can be done about them, even though they may never be realized. Once you have prepared your household to meet these dangers you will have added vastly to your own personal sense of security.

All the information contained in *Family Survival Handbook* has been taken from official publications, and represents the most authoritative data on nuclear survival available to anyone. What we have done is to bring together in one volume all the material heretofore available only in scattered booklets and folders, and to present it in an orderly readable format, carefully arranged and indexed so that any subject may be instantly referred to. A full list of civil defense publications is contained in the Appendix. Their contents have been digested, combined and amplified, and full acknowledgment is made by the authors of their use as source material for this volume.

The authors are particularly indebted, also, to the Structural Clay Products Institute, Washington, D. C., for information contained in their publication "Clay Masonry Family Fallout Shelters"; and to the National Concrete Masonry Association, Chicago, Ill., for similar information on concrete block shelters included in the booklet "The Family Fallout Shelter." Both of the foregoing publications have been issued by the Office of Civil and Defense Mobilization (now called Department of Defense), and both have been drawn on freely, both for textual matter and for illustrations and plans.

Appreciation is also given to Col. John H. Brubaker, County Director of Civil Defense of Northampton County, Pennsylvania, for his encouragement, advice and unstinting help in the preparation of this work.

The Einstein letters, from which excerpts are quoted in the Prologue, are contained in full in "Formula for Death," by Fernand Gigon, Roy Publishers, 1958. Quotation in Chapter 2, with reference to the movie "On the Beach" is from an editorial by Stewart Alsop in the Saturday Evening Post for July 23, 1960.

Easton, Pa., November, 1961

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NOTE: In addition to the plans of family fallout shelters (Appendix A), there are many illustrations in this volume. These are indicated in the text, together with their positions, which generally follow the related chapters.

PROLOGUE

Seven men sat before the banked consoles of a highly secret installation seventy-five feet underground somewhere between the 60th and 70th parallels of latitude, and within the political confines of the United States of America. The man in the center faced a huge radar screen and on either side of him his two coordinators watched an identical pattern on smaller oscilloscopes. The two men on their left faced the dials and controls of the complicated tracking and computing Univac, and the two on the far right controlled the radio bands of the communications system. They were an operations crew of BMEWS (Ballistics Missiles Early Warning System) and none of them was below the rank of Captain. All except the three men at the scopes were on standby status. Only if the radar screens picked up a signal from the huge collector at the surface would they swing into operation. The function of this unit was to detect immediately the launching of any missile-type weapon anywhere within their particular sector of the northern hemisphere. Their effective range was 2000 miles or better.

Their country was at peace, but these men were on a 24-hour wartime alert. Their responsibility was to detect any sneak attack the moment it left the launching pads of a hostile power. At their fingertips lay whatever chance for survival there might be for most of their 170 million countrymen in the face of sudden attack.

In front of the officer in the center of the group was a single red knob—the warning button—and the instant he touched it the warning signals in a thousand towns and cities would sound the alert, and SAC bases in every section of America would send their bombers and interceptors into the skies.

This morning, as on all previous mornings—all the previous time the BMEWS base had been in activation—everything was quiet. There was unrest in the Carribbean, Africa was disturbed, the Arabic countries were predictably unpredictable, but not alarming. The cold war was still not to be denied, but nothing seemed to give cause for any alarm. True, the newswires overnight had carried the unconfirmed rumor of an incident which might have international implications, but none of the press services seemed to have discovered just what this incident might have been or where it had occurred.

The seven men underground had no concern, however, with news or rumors. Their job was simple and precisely defined: alert America the instant the first hostile missile leaves its launching pad; track its course, plot its objectives, hit the button—and pray.

Four thousand miles southward of the BMEWS station, in a little town on the northern rim of a spreading industrial valley—one of hundreds of such valleys, each almost the counterpart of the other, in continental United States—this morning was just like any other. Family groups buzzed around a hundred breakfast tables as America swung into stride to face another day. One more day in the history of the world.

Some of the men of the town who worked in the industries at the far side of the valley had already left for work, but now—it was about 8:15—the nine o'clock workers were getting ready to leave their homes and the schoolchildren were swarming out of the houses all over town and heading off.

This particular little town, with a population of about 6,000, hugged the base of a long range of wooded hills called the Catatunings, a corruption of the original Indian name which had meant "the first mountain." The town had grown rather rapidly for a short time immediately after the War, and some of this expansion had carried it farther up the slopes of the mountain, where a number of modern homes had been built.

The morning was fine, the air sharp and clear. Across the extreme southern edge of the valley, outlined against the long low line of the distant hills, mile-long streamers of smoke drifted imperceptibly westward in gently broadening lines, like grayish crayon strokes against the darker tone of the hills. Each smoke plume, drawn taut and motionless by distance, marked the location of one of the great industrial plants of the tri-city metropolitan area which sprawled across the south side of the valley. Their sources were the roasting kilns of the cement mills, the cupolas of the foundries, the retorts, crucibles and ovens of the chemical and ceramics plants. Farther to the west, where the huge complex of the steel mills began, the smoke-pattern changed and some of the plumes became many-shafted, rising straight upward in firm dark parallel lines above the crowded stacks of the blast furnaces, and then feathering off to the westward as they reached the upper air currents.

Between the town on the slope of the northern mountain and the steel mills along the base of the hills on the south lay fourteen miles of fertile farmland. This fine October morning a tang of frost still hung in the air. There was a hint of haze in the hollows between the low rolling hills of the valley floor. The leaves had turned and every patch of woodland was a brilliant tapestry of color. The corn stood shocked in the fields, the silos stood filled, the barns bursting, and the herded cattle grazed placidly on the late growths of grass and alfalfa, moving sluggishly across the browning slopes of the near hills. The whole countryside seemed to radiate a patina of peace and plenty, the euphoria of the harvest season. The sharp savor of life and of living was at its keenest.

At 8:24 o'clock of this October morning a late commuter stepped from one of the houses in the upper part of the town and walked briskly to his garage. Minutes later, as he was backing out of the drive, one of his neighbors came running down the street, hailing the man in the car as he ran, obviously asking for a lift. The driver stopped and waited, throwing open the door on the rider's side. The other slowed to a walk, puffing a little. He was still twenty feet or so from his neighbor's car.

Approximately one minute earlier, at 8:23, the watchers at the distant BMEWS station had noticed a faint disturbance on their radar screens. Split seconds later this had resolved itself into a definite image. By 8:23:02 the source of the signal had been fixed and they had tentatively identified it as a long-range missile, perhaps several, already air-borne and probably armed. Plotting and tracking operations had begun instantaneously, as the returns from the radars fed automatically into the electronic computers.

At 8:23:10 the tracking instruments had established the course of the missile. The ranking officer hit the warning button, and the alert went out to the key stations and distribution points and began filtering down through the state, county and sector headquarters to the local levels throughout the nation.

At the point of discovery of the radar image no one on the BMEWS staff could be completely sure that this was a hostile attack. Their instruments had indicated definitely that missiles from a foreign source had left their launching pads, and as the seconds passed it became obvious that these missiles had traversed the stratosphere and were entering the ionosphere. The Univac had plotted their trajectory as extending between one and two hundred miles into outer space, placing their destination 5000 to 6000 miles from point of origin. As the inhuman computations of the instruments proceeded, the path was established, and within ten seconds after discovery the destination was plotted. It was well within the United States.

The SAC interceptor bases throughout the country had, as a matter of routine, been alerted immediately upon discovery. Now that the point of impact of the invader had been pinpointed, there could be no remaining doubt that the attack was hostile. The nation-wide alert was sounded.

By the time the local alerts were sounded, although only slightly more than five minutes had passed since discovery, the missile had traveled almost a thousand miles toward its destination.

At 8:28:06, in the little town along the mountain, just as the guest rider, still a little out of breath, was stepping into his neighbor's car, the siren at their CD headquarters down in the town hit the air with the long, steady, continuous blast of the alert signal.

The two men looked at one another in sharp perplexity.

It was a perplexity shared in varying degrees by all their neighbors. No one could recall an air-raid alert ever having been sounded without previous warning. Their first reaction was bewilderment, followed almost immediately by the self-consoling conclusion that this was undoubtedly a new form of practice alert, sprung on them without prior announcement.

Many, acting on impulse, opened their house doors, even ran out into the streets and yards, as though they could somehow, by looking up into the skies or consulting with their neighbors, discover the truth. Little groups and scatterings of people began to gather here and there.

A few people shrugged it off entirely, taking it for granted that this was a drill and leaving the observance of it to others. Some rushed to their telephones in search of an answer, and within minutes the circuits became almost completely clogged. Operators began intercepting signals and warning the callers to clear the lines so that vitally important messages could get through.

Housewives who had been listening to accustomed morning programs on their radios became suddenly aware that they had gone silent.

Schools, industries and public institutions, well drilled to observe any alert, began moving their personnel into prepared shelters, carrying out their planned procedures without question, knowing that whether the alert was real or simulated they were responsible for observing it.

This was likewise the reaction of a final element of the people, perhaps the largest. Those active in civil defense, or who had informed themselves of its workings, did not question the authenticity of the alert, but began as calmly as they could to do the things they had trained themselves to do in such circumstances. Housewives, and with them the men who had not yet left their homes, gathered their children and took them to whatever shelter they had prepared. Civil defense workers moved quickly to their assigned stations. Helmeted block wardens and auxiliary police and firemen proceeded to their posts and took up their duties.

At 8:32:06 the sirens abruptly went silent after four solid minutes of uninterrupted screaming. Now the Conelrad channels came alive and radios tuned to 640 and 1240 megacycles informed their listeners that this was not a practice drill. Repeat: not a practice drill.

At 8:32:30, almost immediately following the ending of the alert, the take cover signal began—the wailing, rising and falling screams of the sirens and accompanying them the insistently repeated short bleating blasts of the unmodulated horns and whistles. Their urgency was unmistakable.

Now in every block the CD wardens were in action. Pleading, urging, cajoling, and finally forcing the people to go back inside their homes and take cover. The unexplained sound of the sirens had brought far too many out into the streets, inquiring what was going on, what was wrong, what was going to happen.

"Get back into your homes," the wardens insisted. "Get into your shelters. We don't know yet what it is. But we can't take chances. Get off the streets. Get under cover. For God's sake get those little kids out of here." For God's sake!

And this was not blasphemy!

These men knew!

At 8:38 a.m. a blinding flash of light enveloped the whole valley. Its brilliance was so inconceivably intense that it extinguished the sun. The deepest shadows became whitely radiant. Those who happened to be looking directly at the source of the light when it burst were instantly blinded. Some did not regain their sight for hours; some never saw again.

The duration of this blast of light was one ten-thousandth of a second, and its origin was almost at the center of the steel mills fourteen miles away.

Those whose eyes had been shielded from the blinding flood of light and who still had their sight could now see a chaos of red streaks, the fireballs, shooting criss-cross in every direction along the whole south rim of the valley in a mad barrage of destruction, without pattern or form, like an uncontrolled madness of Hell.

Then as they stared, benumbed and unbelieving, the watchers saw an immense intensely blue ball begin to form at the blast point, shimmering and ponderously swirling at first, and then rapidly beginning to rotate, uncannily as though it were being turned by unseen giant hands; growing larger with each brain-chilling revolution. As it grew the ball changed sharply in color, becoming a brilliant blinding white, and rose softly off the floor of the valley, dwarfing the hills completely; and then, gathering sudden force, it shot with incredible velocity straight into the sky. When it had reached a height of 30,000 feet—almost six miles—its top flattened out and began to boil and curl outward and downward and back into itself again in a quickly spreading cloud until it had taken the shape of a gigantic mushroom, supported on a thick stemlike mass of matter drawn upward in a solid swiftly moving stream by internal forces of chaotic violence. As the obscene mushroom shape grew, it changed color again, becoming a violent and blinding red, and the whole broad valley now lay as though bathed in blood.

Not more than ten seconds had passed since the first blast of light. The entire area lay under a dead and ghastly silence. Then an intolerable wave of heat struck the mountain slopes above the town and the whole town itself. So intense was this heat that all who stood unprotected from it felt on their exposed skins the sharp sting of pain caused by a deep burn.

Now scattered fires began to spring up in the town and over the entire valley; bursting flowers of flame, becoming more and more thickly bunched as their remoteness from the blast center decreased.

In the far distance, for several miles on each side of the epicenter (which is the point from which the blast waves go out), the horizon was completely barren of flame. In that region only the towering mushroom shape remained, now slowly dissipating, at its base a weird fog mass of vaporized matter ponderously gathering and spreading. On either side of this area of desolation huge fires were already raging in a solid corona of leaping flame and rolling masses of smoke.

Fifteen seconds had passed. It was now 8:38:15.

Following the waves of heat and bearing them along came a searing wind, unearthly and of hurricane velocity; fluctuating, drawing back as it were and then striking again and again—an unending succession of violent blows from which there was no escape and before which everything but the staunchest structures shattered and fell.

It was a wind of death. With it came the first nuclear dust—the beginnings of the radioactive fallout.

At 8:39:20, less than a minute and a half after the first light-flash, the sound waves of the blast hit the north side of the valley. Their impact was like nothing anyone had ever heard before. Even at that remote distance the noise was so intense that it could paralyze the delicate mechanisms of the middle ear. Those exposed to it became temporarily deafened and for them, and indeed for all who survived, the world descended into a sublime silence. And into this silence, and through it in increasing intensity now, kept falling—themselves in abysmal silence—the incalculably deadly infinitesimal particles of the radioactive residuum.

With fatally misleading gentleness—invisible, silently but inescapably—the rain of death fell. The violence, the sound and tumult were all over now. Nothing remained but the quietly falling, completely unseen, completely deadly rain of the fallout.

And now it was that the stunned people of the town began in frantic haste to scrabble for shelter wherever they could find it. Those who were prepared were perhaps no less terrified, but they had at least the knowledge that they had done what could be done to protect themselves. Paralyzed by stark terror, those who had neglected even the simplest precautions were almost helpless. Blinded, burned, numb with fear and panic, men and women and helpless children fought desperately to find a way of escape from oblivion and death.

Is this real? Could it ever be? Will it ever happen to us? Frankly, we don't know.

What we do know is this:

1. It is possible.
2. If it did happen, it would happen just about as we have described it.
3. If it does happen, only those who have taken all possible measures toward survival will live.

The description of what might happen in an imaginary little town on the fringes of a blast area closes on a bleak note—a desperate scramble for any means of protection by a people demoralized by fear. Actually this is not the end of the story, but only the ending of a phase. The next phase had already begun when the first planned defense measures went into operation. It unfolded rapidly when the block wardens took their stations and began clearing the streets of people. As fires sprang up the fire-fighting squads went into action all over the area; auxiliary police assumed their duties, keeping traffic lanes open for the passage of rescue trucks and ambulances; trapped people were being freed and the injured were being given emergency treatment. At civil defense headquarters communication was being established with other areas and information was being exchanged on the extent and potency of fallout, the condition of bridges and highways, and plans for evacuation. Trained radiation squads were taking the measure of the fallout intensity; Conelrad was broadcasting warnings and advising the proper safety measures to be observed. The first phase of civil defense was smoothly in action.

With the passage of time civil defense would take over the second phase of its planned activities: the procurement and allocation of food, clothing and emergency supplies to enable the distressed populace to survive until the nation's economy could return to normal.

* * *

Civil defense is very much a reality today. Its workings are fully described in Chapter 12, and frequent reference is made throughout this *Handbook* to various areas of its operation. At full strength civil defense will require the services of something like 15 million workers. There are no accurate figures presently available, but it is generally estimated that the number of those currently attached to its services is about one-fifth of the total required for full effectiveness under attack conditions. Obviously there are plenty of jobs open. Except at staff level, few of these jobs will make serious demands on the time of a volunteer. Most do, however, require some training, and the time for training is now, and not after an emergency has developed. Civil defense needs and deserves considerably more public support than it has so far received, and it needs that support quickly.

Properly staffed and manned, civil defense will stand ready to go into action any time it may be needed, and under conditions of actual nuclear attack it will provide the only means we now know of to enable our nation and its citizens to survive and to recover.

Most people seem to be fully aware of this, and the general attitude is one of confidence. Such confidence is well based, but only if the civil defense organization is fully manned and trained.

There is, however, one phase of survival in which civil defense must be augmented by your own personal efforts. CD is designed largely to operate at the community level and to provide survival for numbers of people. It cannot make the necessary preparations to provide safety for your *own* household. That you must do yourself. And in the first phases of an emergency, when others—perhaps thousands—may be much more seriously affected than you, civil defense cannot undertake to place trained workers in your home to ensure the survival of your family. This too you will have to take care of yourself.

We are going to tell you in this *Handbook* exactly what to do, when and how to do it, to give yourself and your family the best possible chance for survival.

We are going to teach you to "do-it-yourself."

The acknowledged purpose of this *Family Survival Handbook* is, then, to present every possible means to preserve lives in the face of nuclear attack and by so doing to insure in some measure the ultimate preservation of America, its civilization, its culture, its entity.

The specific information contained here is accurate, its sources are unimpeachable, and its validity is derived from the exhaustive research programs of authoritative government agencies.

Every presently known means available to you for the survival of your family is carefully detailed in the succeeding pages of this *Handbook.* We have defined it as a "do-it-yourself" guide, and that is exactly what it is.

The authors are firmly convinced that the subject of the *means* for survival—no less than the subject of survival itself—is not of a controversial nature. If you say that the only true solution to the problem is the abolishment of war, we will agree with you completely. But we still maintain that *until* the world's great powers have definitely agreed upon and fully implemented a program of world peace there can be no cessation, no let-down of defensive measures. We believe, further, that this applies to every phase of defense—from the most fabulous-seeming science-fiction type of space-oriented investigation and research all the way down the scale of human experience, or possible experience—even to the problems of the man frantically striving to put out a little fire caused by a short-circuit in the bomb-damaged walls of his five-room home.

Men make war, and the whole world-show today must be run entirely from the viewpoint of possible war.

Facing the threat of any such nuclear war, we believe that the only defense is preparedness. That the best deterrent to attack is the means for a retaliatory attack of equal or greater destructive power—and the foreknowledge that the country which might become the subject of attack is fully prepared to withstand it.

We believe that the people of America, and the high state of civilization represented by their culture, should be preserved intrinsically; that the only ones who will be able to live through such an attack will be those who possess a knowledge of the means for survival and who have prepared themselves in advance.

We must learn the means by which we may survive a nuclear attack. Until war is abolished, we must learn to survive, and in today's world this means one thing: survival in the face of nuclear attack.

Whether war can be abolished is indeed a subject for controversy, but it is a controversy which does not particularly concern the objectives which are implicit here. What concerns us is the means to employ to increase our chances for survival if nuclear attack does occur.

The whole concept of nuclear energy developed from one man's genius. The man was Albert Einstein, and from his theory of relativity were derived all the calculations resulting in the splitting, so-called, of the atom. Einstein himself has said: "In the whole history of science the manufacture of the hydrogen bomb is the most appalling mistake the scientists have ever made."

Einstein died tortured by nightmares of Hiroshima and Nagasaki, but he died also knowing that his adopted country had the means of employing, by virtue of his discoveries, vast hitherto hidden sources of energy for the advancement of human needs.

Fernand Gigon, in his factual presentation "Formula for Death," has quoted certain theretofore unpublished letters of Einstein. In one of them Einstein said: ". . . so long as the nations of the world do not cooperate to abolish wars, so long as they will not settle their differences and protect their interests by legal methods, they must be prepared for war . . . War at present means only complete annihilation . . . The only effective method (of defense) is the abolition of war itself or of the causes of war . . ."

Einstein went still further. In a subsequent letter he wrote: "The problems of peace and security are the most vital ones for our generation. On their solution depend the welfare and the very existence of ourselves and our children. Recent advance in offensive weapons has created means of destruction hitherto unknown . . . That is why if we allow another war to take place, most of humanity will be destroyed, towns will be reduced to ashes, and the very earth poisoned. Such disaster can only be avoided by creating a world government possessing all weapons and controlling all military institutions . . . A government with such immense power can only come into existence if all the peoples of the world realize that no more economic method, that none more suited to the traditional political thought of the individual nations, exists. This . . . must be achieved before it is too late."

Remember, this was Einstein, who knew perhaps better than any living man the ultimate potential, the inconceivable forces which could be activated by the splitting of the atom.

There can be no doubt that until world peace is attained, we deal with an indefinite future in which attack is never expected but must never be written off. We cannot afford to speculate in survival. The next war could be nuclear and it could be fought in the United States. When it comes, your chances for survival will depend on the means for protection you now prepare. There will be no time after it strikes ever to do what should be done now.

There can be no doubt, moreover, that this is a civil defense race, just as surely as it is an armaments race. Only through proper preparedness can we enable ourselves to withstand an all-out attack, and to recover and win. This is a state of non-military preparedness, and when we have achieved it, an enemy should be convinced that nothing would be gained by an attack against us.

CHAPTER 1

DO-IT-YOURSELF SURVIVAL

Many people seem reluctant to admit before their neighbors and friends that they consider nuclear attack to be anything but a remote possibility. We are apt to fall into an attitude of skepticism best expressed by the time-worn cliché "it can't happen here," which was probably first used at the time of the Flood.

The Book of Genesis fails to tell us what comments Noah had to endure from his rowdy neighbors while he was building the ark, but he went ahead and built it anyway, and he and all his family were saved. If you earnestly want to provide for survival, go right ahead. You may be surprised to find that your neighbors are right in step with you.

Whatever you do, don't panic—now or at any other time. If you want to, you can make your preparations in easy stages in as simple a manner as possible, without spending unusual amounts of money. It will be the very minimum of preparation, not at all costly, but it may be all you feel you can afford, or consider necessary.

Here are the steps to take to provide what is generally considered an absolute minimum of protection:

1. Learn your local Air-raid Warning signals, and if your community has an evacuation plan, learn the evacuation routes. Cost . . . Nothing
2. If you live 15 miles or more from an assumed aiming point for enemy attack, select that part of your home most remote from its exterior walls, if it is basementless, an inner hall or a bathroom; if it has a basement, a corner of the basement where there are no

windows. Call this the "shelter" and teach your family to go there immediately at the sound of the Take Cover signal. Cost . . . Nothing

3. Prepare an emergency first-aid kit and keep it in the shelter. There is a list of items for this kit in Appendix C, page 296. Maximum Cost $10.00
4. If you do not already have one, get yourself a battery-operated transistor radio with an extra set of batteries. Mark the dials for both Conelrad channels, 640 and 1240, keep it near the shelter, and *take it with you into the shelter* when you go there. If your shelter is in the basement, you may require a simple antenna above ground. Ask your radio man how to provide for this. You will find additional information under "Radio Equipment" on page 160. Cost $35.00
5. Stock your shelter with drinking water, replacing it with fresh supplies every month or so. Store it in jugs or bottles. (A two-week supply is a minimum of seven gallons per person.) Complete information is on pages 102-108. Cost . . . Nothing
6. Each week when you do your marketing buy a few extra items of canned or dehydrated foods and place them in the shelter until you have accumulated there an adequate emergency supply. This should include powdered or canned evaporated milk, juices, fruits, vegetables, soups, meats and meat substitutes, ready-to-eat cereals, crackers or cookies and beverages. Quantities are given in Appendix C, page 299, and more detailed information in Chapter 6. Since these foods can always be returned to the regular pantry shelves, whatever you spend on them will be returnable. The size of your family will dictate how much you will spend. Cost $10 to $50
7. If you have an ordinary five-gallon garden pump spray, keep it somewhere near your shelter. Also a couple of buckets of water, covered, (a barrel is good too), and a bucket of sand. Have these stored *before* you need them; after the Take Cover signal there will

not be time, and later there may be no water. If you buy a sprayer the so-called "trombone" type is best; you can operate it right from the bucket. Refer to section on "Knowing How to Fight Fire," page 62.

Cost . . . about $5.00

8. Have in your shelter also the following: (You probably have all these now—simply change their location in your home)
   - Cots and blankets
   - Paper plates, cups and napkins
   - Openers for cans and bottles
   - Can for garbage (20-gallon)
   - Covered pail for toilet purposes
   - Toilet tissue, paper towels, sanitary napkins, disposable diapers
   - Soap
   - Newspapers for garbage or as soil bags
   - Flashlights, electric lantern, spare batteries
   - Paper and pencils
   - Clothing

   Cost, if you have them all . . . Nothing
9. Keep your car in top shape; battery charged, radio in operating condition. Always keep your gas tank filled, ready for a quick trip to a safer area.

   Extra Cost . . . Nothing

If you consider this minimum to be sufficient, you can now consider yourself prepared, ready for an alert.

The Alert Signal is a steady blast of three to five minutes on sirens, whistles, horns, or similar devices. When you hear it:

1. Turn off your water, gas, fuel oil lines, and pull your main electric switch.
2. Tune your battery radio to a Conelrad station (640 or 1240 kc.) for emergency instructions.
3. Do not use your telephone.
4. Do not panic.

5. Give a final quick check to your shelter. Replace any items that may have been removed. (They shouldn't have been!)
6. Shut all outside doors and windows. If your house has shutters, close them also.
7. Check everything once more.

The Take Cover signal is a wailing tone on sirens, and a series of short blasts on horns or whistles. It will continue for three minutes. When you hear it:

1. Go to your shelter immediately.
2. Take your radio with you; keep listening to Conelrad.
3. Stay there until you get word to come out. Follow all instructions as you hear them on Conelrad. There is now nothing more you can do.

CHILDREN AND OLD FOLKS IN THE SHELTER

Shelter life will not be without its problems even for normal healthy adults. For the sick, the very elderly, and for younger children special measures must be taken. Chapter 5 will tell us a great deal about home nursing under shelter conditions and will also point out how we can learn more. If there is illness in the family be sure you have provided spare rubber sheeting, extra medicines, emergency canned foods for diabetics or others requiring special diets, and a reserve supply of any special equipment needed by the patient.

For babies and very young children see that there is plenty of canned milk and of their accustomed canned or formulated foods, and an ample supply of disposable diapers. So long as they are properly fed and hygienically cared for, their environment won't make a bit of difference to their way of life.

The elderly may present a special problem—a psychological one. It will be your duty—not only from humanitarian considerations for them, but in order to protect the morale of the entire shelter group—to watch closely their mental attitudes. Do not allow them to become discouraged or despondent. Such attitudes are communicable. Don't let them get the feeling that life is over for them in any event, and that now nothing matters. It matters now just as much as it ever did—and more. Make as earnest an effort to keep the old folks occupied as you do with the children. Encourage them to read (or to be read to). If you can't stock your shelter with all the best-sellers, perhaps you can compromise with just one—the all-time best-seller. It takes quite a long time to read the Bible through even once.

Active children will likely be a particular problem. Provide on ahead for simple recreation. See that there are some games and amusements on your shelter shelves, and a few of their favorite toys, so that they have some old friends with them on the voyage. (This *could* be a space craft, you know—or a ship!) Keep plenty of paper and pencils available, particularly with children of school age who may be at home. You can make a game of monitoring CONELRAD and letting the older children take their turn at keeping the space-craft log properly entered. The survival of the family will depend largely on information received by radio, and a record should be kept of the information and instructions, including the time and date of the broadcast.

Finally, when you enter the shelter move babies, ill or aged members of the family into it first. Get them settled and comfortable; then the young children, with the others following as quickly as they complete their emergency duties.

All this will be accomplished much more smoothly if you have done it several times before under normal conditions. That is why practice drills should be a part of your preparation. And whatever you will need in the shelter for the comfort of these very special people should be put there beforehand. Make it a part of your personal shelter checklist, and be sure nothing has been missed.

This is all pretty sketchy. It leaves a lot of questions unanswered: What shall I do if fire breaks out? If someone is injured? How much food shall I stock? What about sanitary arrangements? How can we keep warm? Is there a better shelter than just a corner of the basement?

The answers are all here . . . just read on.

When you feel you have all the answers, put the book away—but put it away in a safe place, in your shelter, where you can pick it up immediately if you ever need it again. The answers will always be here, and you may be very glad for them later.

Since we have not been able to tell you, in this oversimplified version of preparedness, very many of the things you should do, here is a quick list of things *not to do.*

HOW TO AVOID FATAL ERRORS

Before the Emergency

Don't panic.

Don't hoard. It is both wasteful and foolish.

Don't wait until an emergency comes before laying in your water supply—or any of your shelter needs.

Don't remove any of the supplies once you have placed them in the shelter, or allow any one else to do so. Check it regularly.

Don't neglect to provide for fresh air in your shelter.

Don't overlook a battery-powered radio and spare batteries. The information it brings may save your life.

Don't make the roof mass of your shelter heavier than its walls will bear.

Don't allow accumulated trash to create a fire hazard.

When the Signal Sounds

Don't panic.

Don't attempt to use your telephone.

Don't move your car unless so directed by your wardens.

Don't leave your home except to seek shelter unless otherwise directed.

Don't become frightened if your radio is silent for a short time.

Don't attempt to reach your children. Don't worry about them; they are being cared for.

Don't leave water, gas or electricity turned on.

Don't leave your shelter until officially told to do so.

During the Emergency

Don't panic.

Don't drink water that has not been purified.

Don't drink, or use for cooking purposes, water other than that obtained from your faucet. (Except of course canned water.)

Don't listen to rumors about the safety of your water, milk or food supply. Let such information be official.

Don't pass such rumors on to others.

Don't eat, or even gather produce from your garden, until your neighborhood is cleared of contamination.

Don't use water flush toilets when water service is interrupted.

Don't fail to take precautions for the disposal of human wastes.

Don't dump garbage on the ground.

Don't help the enemy by putting yourself out of action through carelessness.

If There Is Fire

Don't wait for help to arrive; if there is a fire, fight it.

Don't stop fighting it except to save your life.

Don't search a burning building alone.

If Someone Must Be Rescued

Don't touch a person in contact with a live wire until you have first protected yourself.

Don't pull a trapped person out by brute force. Free him first.

If Someone Is Injured

Don't lose your head.

Don't move an injured person except to reach the wound or unless he is in danger of his life.

Don't try to clean a wound before you dress it.

Don't use a tourniquet unless you know how—use a pressure pad.

Don't use grease, oil or water on a bad burn.

Don't try to clean the burn, and don't open the blisters.

Don't give fluids to unconscious or semi-conscious people
—or to people in severe shock
—or if there is an abdominal wound.

Don't try to set a broken bone or to push back pieces of protruding bone.

Don't move fracture cases unless you first put on a splint.

Don't delay proper medical treatment by a physician.

And Finally—

DON'T PUT IT OFF—DO IT NOW!

CHAPTER 2

THE FACTS ABOUT NUCLEAR FALLOUT

There is no nonsense about nuclear fallout. There has been occasional nonsense written about it, and a great deal of that sort of writing has led to some erroneous beliefs. It would be interesting to know, for example, how many thousands of people who saw the motion picture "On the Beach," based on the late Nevil Shute's great novel, have become convinced that any beginning of nuclear warfare will signal the end of mankind.

As Stewart Alsop, writing editorially in the Saturday Evening Post has pointed out, Shute's work, while outstanding as a novel, certainly is not a technically accurate presentation of the radioactive side effects of nuclear warfare, particularly since its plot is based on two assumptions about the nature of radioactive fallout, both of which are false: the first, that there is no protection against radioactivity, and the second, that radioactive fallout remains lethal indefinitely. Gregory Peck and Ava Gardner "would have survived," says Alsop, "if they'd had any sense. All they had to do was to build themselves a cozy little radiation shelter, which they had plenty of time to do. Two feet of concrete would have given them absolute protection against radioactive fallout, and eight inches would probably have been quite enough. If there was no concrete handy, bags of dear old mother earth would do the trick—three feet of earth for complete protection, a couple of feet for almost-complete protection."

Now, while it is perfectly true that there are simple and adequate measures which can be taken—if you take them while you still have time—to provide protection for your family against the radiation side-effects of nuclear attack, it is no less true that without adequate preparation you may at some tragic moment in the future face the shocking fact that there is no longer anything whatever you can do to save yourself or your family. Unless you have made previous preparation, they will have no place to go. For want of a prepared shelter, you may literally pay with your lives.

No, there is no nonsense about nuclear fallout.

WHAT IS FALLOUT?

Whenever a nuclear bomb is exploded near the ground, large amounts of earth and debris are forced upward into the ascending fireball. The resulting mushroom-shaped cloud may rise to a height of 15 miles or more before leveling off. The earth and debris particles in the cloud vary in size from impalpably fine powder to large grains (early fallout is generally assumed to be in the range of 50 to 500 microns in size, a micron being 1/1000 of a millimeter), and it is these particles which act as the sources of radiation that can damage living cells—this is the fallout. Some of these radioactive particles are deposited close to the point of burst soon after the explosion, and most fall back to the earth's surface within two days—"early fallout". But some—the "delayed fallout"—remain aloft for longer, and both early and delayed fallout may be carried several hundred miles by the winds before they settle to earth. Once fallout is on the ground it may be further redistributed by the action of wind, rain, and snow. This is termed "weathering".

EARLY FALLOUT

In a nuclear attack the immediate and most serious danger would be from early fallout. Therefore the term fallout as used in this handbook refers to early fallout only—and it is almost unbelievably dangerous.

Significant amounts of fallout do not arrive outside the blast area earlier than about one-half hour after the explosion. From then on, it begins to cover an increasingly large area and may eventually blanket thousands of square miles. At any given location, however, the elapsed time between the arrival of fallout and the cessation of deposition may be a matter of hours.

RADIATION

Three different kinds of radiation are associated with fallout—alpha and beta particles, and gamma rays. Radioactive materials that give off alpha and beta particles may be dangerous if they are taken directly into the body through contaminated food, water, or air, but from the shelter standpoint, they present no problem. Alpha particles cannot penetrate the external layer of skin, and beta particles cannot penetrate heavy clothing. However, *gamma rays, like X-rays, are highly penetrating,* and can cause serious damage to living tissue.

MEASUREMENT OF RADIATION

Exposure doses of fallout gamma radiation are measured in units called roentgens. Their effect is cumulative, that is, the strength of each succeeding dose is added to the total units of doses previously absorbed. They may be measured by means of a compact instrument, about the size of a pencil flashlight, called a dosimeter. Indications of the physiological effects of various acute exposure doses are given in the following table:

Short-term whole-body exposure roentgens	Probable effect
0-100	No obvious effect
100-200	Minor incapacitation
200-600	Sickness and some deaths
Over 600	Few survivors

The long range effects, such as shortened lifespans, decreased resistance to diseases, etc., which may occur under the heaviest dosages are not considered here.

PERSISTENCE

The radioactivity of fallout decreases with time—rather rapidly at first, but more slowly as time passes. A convenient rule to remember for this decay process is that for every sevenfold increase in time after detonation, the dose rate decreases by a factor of .10. For example, three hours after a nuclear explosion, measurements taken in an area where fallout is no longer accumulating on the ground indicate a dose rate of 50 roentgens per hour (r/hr). Assuming no weathering effects, the dose rate 18 hours later (21 hours after the explosion) would be 5 r/hr. (One-seventh of the total elapsed time of 21 hours is three and the predicted dose rate at the seven-fold elapsed time is one-tenth of the three-hour dose rate, or .10 x 50 = 5.).

WHERE WILL FALLOUT OCCUR

One thing is certain: If this country is attacked with nuclear weapons, our air and missile bases will be primary targets.

The enemy would try to knock out our retaliatory power.

He might also try to destroy our cities.

No one can be sure now how far the enemy will go.

But it must be emphasized that even if an enemy confines his attack to our retaliatory bases, the radioactive fallout from his nuclear bombs would threaten life in the entire country. An atomic burst on the ground sends up a mushroom cloud from which radioactive dust will fall hundreds of miles away.

Fallout from one test explosion spread over 7,000 square miles of the Pacific Ocean.

The accompanying maps show the spread of fallout after a large assumed attack on military and civilian targets. Hour by hour, the fallout spreads and overlaps until, after 24 hours, it almost completely covers the nation. (see Figs. 1 and 2.)

These maps show where the wind would have carried the fallout from the assumed attack on a given day. On another day, the wind could swing in any other direction and turn safe areas on these maps into areas of extreme fallout danger.

The fallout radiation threat indicated on the map is not uniform. The danger diminishes as the fallout drifts farther from the points of nuclear explosion. But even on the extreme limits of the drift the fallout remains a menace to life and health for some time.

The lesson is: *fallout shelter is needed everywhere.*

WHAT CAN WE DO ABOUT IT

If an enemy attacked today, we can be quite certain that not just one or two bombs would fall—it will be a grand-slam attack. We can expect plane-delivered nuclear explosions at literally hundreds of points. Tomorrow, with intercontinental missiles perfected, this will be multiplied manyfold.

Can we survive—can anything survive after such an attack?

The answer of course is, yes—we can survive, as a nation and as a people. And the extent of survival will be almost directly proportioned, not only to our mass determination to survive, but to our determination, as individuals and family groups, to provide for and to avail ourselves of every possible means to make survival a fact.

WARNING OF ATTACK

We now have a warning system that can alert the nation to an impending attack in minutes.

The North American Air Defense Command (NORAD) has the responsibility of detecting an enemy air or missile attack. OCDM (Office of Civil Defense Mobilization) warning officers are on duty around the clock at NORAD Headquarters. They have immediate access to warning information. Today, OCDM can transmit a warning over its National Warning System (NAWAS) to 200 key points within 90 seconds. As now projected, there will be 276 key points and 88 radio stations and 12 radio networks in this warning system. With Congressional approval, OCDM plans to have in its warning system in 1961, more than 500 key points.

Stations will relay the warning to local governments and they, in turn, to the general public. OCDM is assisting in the development of the state and local warning systems through Federal contributions and by direction and guidance. The objective is to develop a system whereby all people will receive warning simultaneously.

Even with the best mechanical system known, we can only transmit as much warning as we get. Complete surprise is possible, and we need to be prepared.

The American people have always risen to emergencies. That has been their strength. Attacked, they have, sometimes with ponderous slowness, amassed their resources and intensified their efforts until their might became indomitable. Often it seemed as though wars were about to be lost while America prepared, but then slowly the trickle became a tide, which kept rising and swelling until it grew into a mighty force that swept everything before it.

Those were the wars of another era. They were predictable; they gave ample warning. Even after the attack started, critical phases were often a matter of months.

In this nuclear era, attack will come almost instantaneously. Warning time has been reduced to a matter of hours, perhaps minutes. The great American strength must be mobilized *before* attack—not after. This time, we must be ready before it comes.

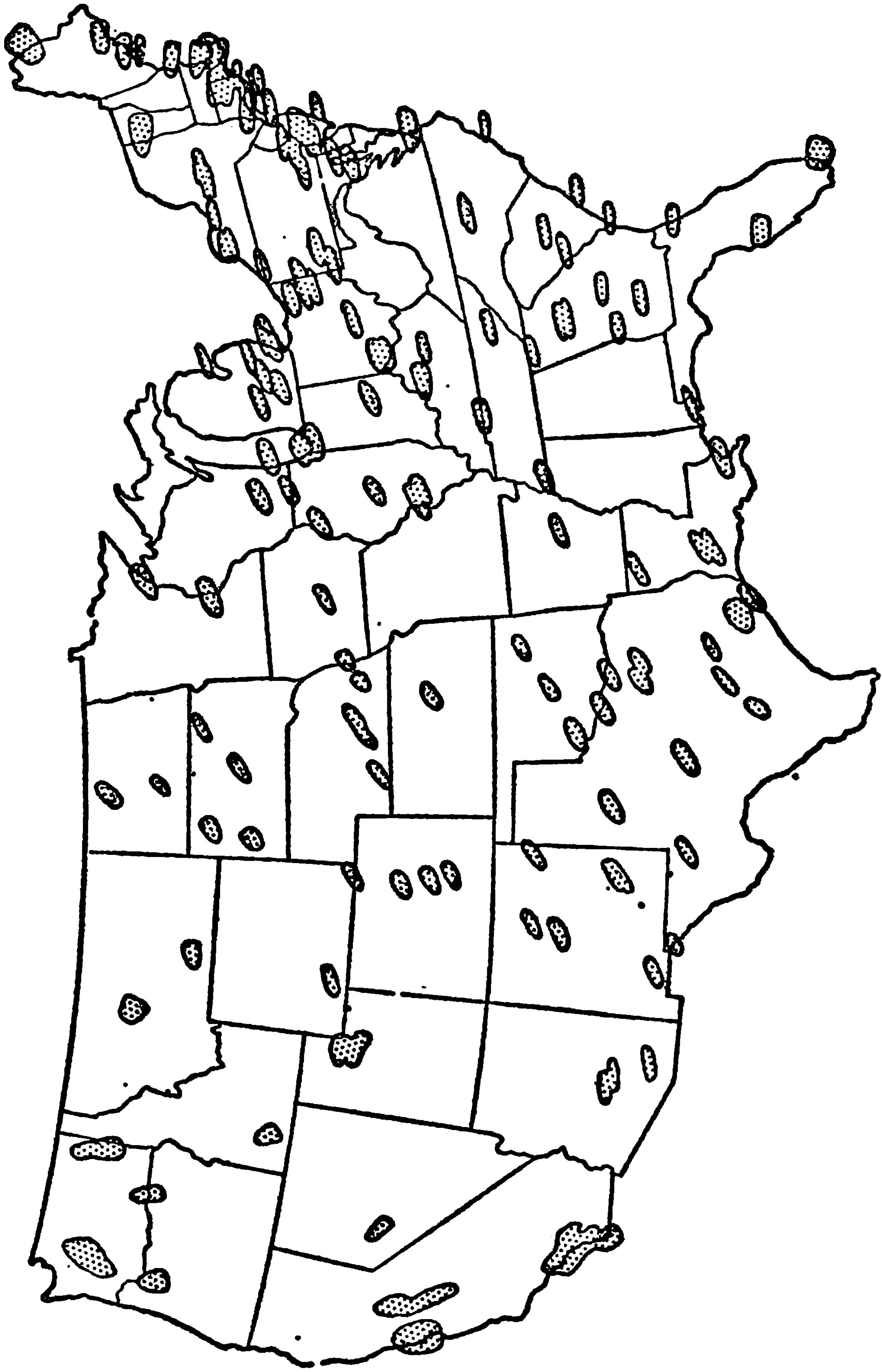


Figure 1—Fallout areas at one hour after detonation

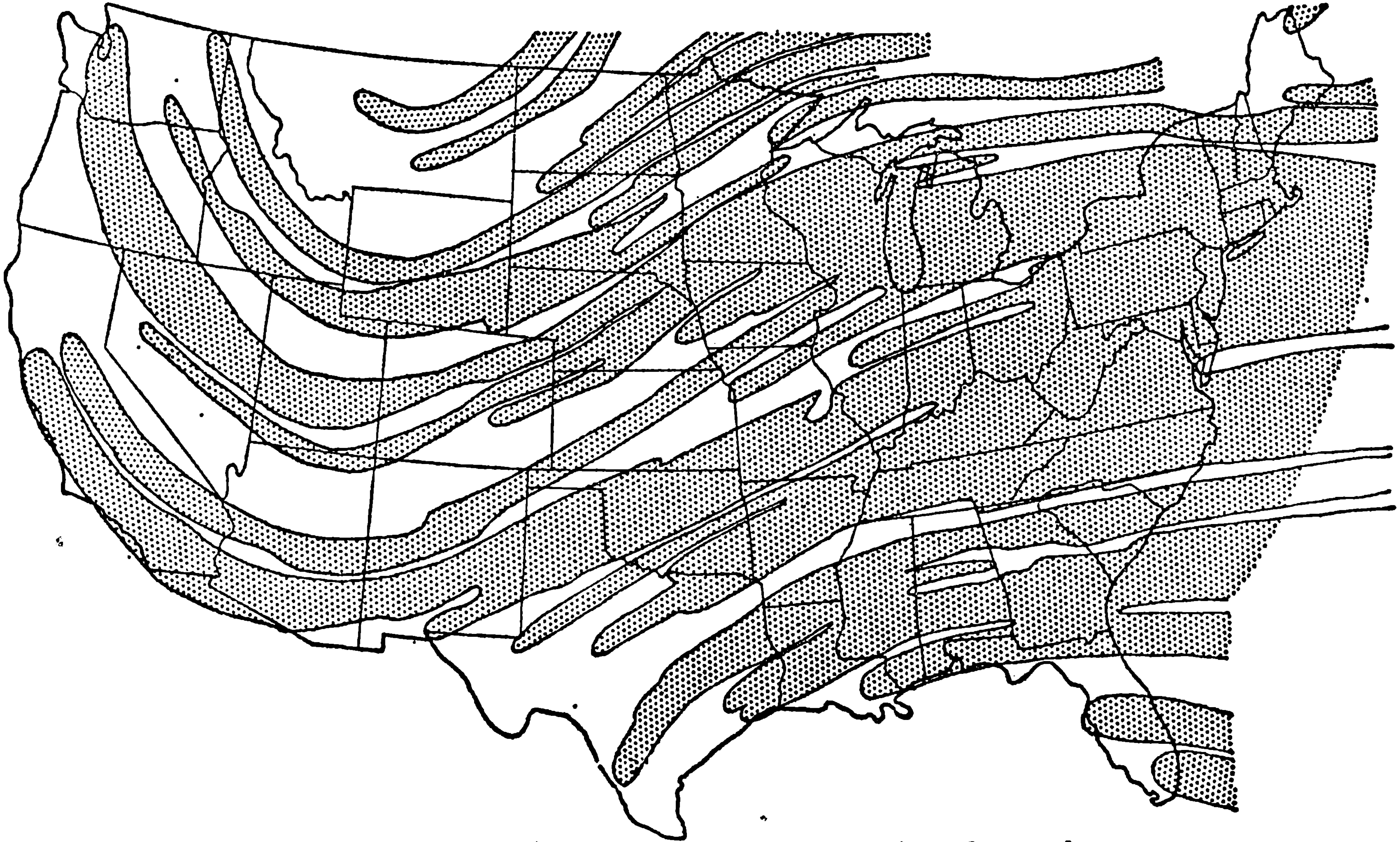


Figure 2—Fallout areas at 24 hours after detonation

CHAPTER 3

THE FIVE STEPS TO SAFETY

The National Plan for Civil Defense and Defense Mobilization requires that every American learn five simple steps to safety:

1. Warning signals and what they mean
2. Your community plan for emergency action
3. Protection for radioactive fallout
4. First aid and home emergency preparedness
5. The use of *Conelrad*—640 or 1240 on AM radio—for official information and direction

The first, second, and fifth steps will be treated here; the subjects of protection from radioactive fallout and preparedness will be extensively covered in the remaining chapters.

WARNING SIGNALS AND WHAT THEY MEAN

There are just two signals which will be heard before attack comes. They may arrive anywhere from hours to seconds before zero. They are the Alert Signal and the Take Cover Signal. Under actual attack, there will be no all-clear signal, because clearing will only take effect gradually, and may be a matter of days—even weeks.

Alert Signal

The Alert Signal is a steady blast of three to five minutes of sirens, whistles, horns, or similar devices. When you hear it, immediately tune your AM radio to a Conelrad station

(640 or 1240 kc) for emergency instructions. Know your local Civil Defense emergency plans. Obey police and Civil Defense instructions. DO NOT USE THE TELEPHONE. *Its entire facilities will be required for communications vital to defense.* If your radio is silent for a short time, *do not* become panicky. This is necessary to switch to emergency frequencies and to clear the air-lanes. At the first indication of enemy bombers approaching the United States, all TV and FM and all standard AM stations will go silent. *Turn off all utilities*—gas, water, electric.

Take Cover Signal

The Take Cover Signal is a wailing tone, rising and falling in pitch or, where this type of siren is not present, a series of short blasts. It will continue for three minutes. When you hear it, if you are at home, go into your home shelter immediately. If you have none, shut all outside doors and windows and take cover in the basement—or in an interior first-floor room. Keep your shades drawn to guard against flying glass. *Do not leave your home,* except to go to a prepared shelter, unless so directed by your wardens. Unauthorized travel may take you directly into the path of an invisible but deadly fallout. OBEY YOUR WARDENS! They will have official plans and orders for you, and will keep you informed.

If your children or other members of your family are away from home, try not to worry about them. Do not attempt to reach them. School authorities are trained to take care of your children and registration centers will be established at the reception area so that families can be quickly reunited when the danger is over.

If you are outdoors, away from home, seek the best available cover.

Bright Flash of Light

There is a third warning which takes precedence over all others. Regardless of whether you have heard an alert signal or not, if you see a bright flash of light, take cover *instantly*. This will be it. At that second, you will know the full merit of all you have done to prepare for survival.

YOUR COMMUNITY PLAN FOR EMERGENCY ACTION

Now, as rapidly as your then prevailing local conditions permit, depending on whether your community is on the fringes of a nuclear blast, or more remote from it, first the emergency and then the survival phases of your Civil Defense will move into action.

What that plan of action will be has already been determined with reference to your own area. It may be varied by strategic location,—your nearness to important military and defense installations, industrial complexes and regions of heavy population concentration—or by your potential importance, though remote from predictable blast points, as a reception area for refugee groups from more affected localities. What that plan provides is vitally important. Inform yourself of it as the first phase of your immediate preparation for survival. The best way to learn about it is, of course, to become a part of it, but in any event, put yourself in touch with your local director of Civil Defense and make certain you have all the information available.

The mass of this information, its complexity and scope—and yet the simplicity of its operation under efficient organization and direction—may well amaze you.

You will learn, for example, that aside from the education and training phases and the technical and engineering services, which have been going on since the inception of the National Plan, civil defense activities are grouped into five principal divisions—Security, Communications, Transportation, Medical, and Welfare. In practically all sections of the country, these divisions have even now been staffed, usually by direct participation, but at least through manpower pools from which professionally trained personnel can be called upon to carry through the emergency phases and to serve during the survival and rehabilitation periods.

Immediately after a blast, the civil administration of your community will, for the emergency period, be taken over almost completely by the civil defense organization in cooperation with existing civil authority, and from then on will be operated under their plan of action. This will be an adjunct to established public services, but not subservient to them.

Security will, through its auxiliary police and wardens, take over and direct much of the rescue work and the control of traffic—which can become of prime importance in the event of mass evacuation. Through its auxiliary firemen and fire fighting equipment, it will have an important function in saving property.

Communications, centered in the area message center, will maintain contact with other areas, either by public telephone, telegraph and teletype, or in the event of failure or destruction of these facilities, by short-wave radio. It will be their job not only to correlate regional rescue and defense efforts, but to bring in vital information directly affecting your own area. Other short-wave facilities will maintain communication with local CD groups within your particular area, and in the event of inability to make contact by such means, messenger services have been developed. Even carrier pigeons are ready for use in some sectors.

Transportation will have made preparation to call on railway facilities, bus lines, taxi services, and trucks to move large numbers of people from contaminated areas into safer zones, or in some cases to accept mass refugee movements from other areas. Local travel routes are intimately known, together with strategic bridges, and alternate routes are minutely mapped in the event that travel might become impossible on any given itinerary. It will be a vital function of Transportation to provide for the movement of supplies into the area and to insure the availability of ambulance and emergency equipment where it is most needed.

Medical will tie together and allocate professional personnel wherever it is required, utilize existing hospital facilities, and direct the setting up of auxiliary hospitals and operating rooms and the disposition of nurses and technicians. It will have the responsibility of quickly setting up first aid stations and seeing that they are properly manned and serviced. It will be in charge of sanitation and health, either of which could become a work of major proportions. And, in the event of a direct hit, theirs would be the task of providing mortuary services, including registration.

The first job of Welfare will be to provide emergency housing. Their records include tabulations of homes where small groups, particularly of women and children, the aged and sick can be accommodated; buildings and public places in your area where larger groups can be accommodated; and if the area has been chosen as a point to which refugee groups from other areas will be sent, Welfare will have prepared in advance for such an influx. Next will come the jobs of providing food for survivors and of setting up mass care centers. By availing themselves of the Federal participation plan, many central Civil Defense organizations have already stockpiled tons of food, much of it from government surplus stocks, for use in a nuclear emergency—but it will be the responsibility of Welfare to insure the availability of additional foodstuffs needed and to insure their delivery. They will have to provide clothing and the other bare necessities so that life can go on among the survivors until the economy reaches something near normal again. And it will be their job to register all displaced persons and to set in motion the proper inquiries so as to reunite families which have been separated.

Today, in most parts of America a great deal has already been done to implement this Plan of Action. Many areas stand ready to go into full operation at instant notice. Some places may be fully prepared, some few relatively unprepared. The last published figures indicate that survival plans have been prepared by 48 states, one territory, and 173 metropolitan areas. Not all of these are in operational readiness at the local level. There is only one way in which you can learn just how well prepared your own locality is . . . ask. And if you find that preparation is inadequate, you can do something about it. Now. Before it is too late.

CONELRAD

If you are listening to any radio or television set when the alert sounds, you will hear a message like this:

"We interrupt our normal program to cooperate in security and civil defense measures as requested by the United States Government . . . This is a CONELRAD radio alert . . . Listen carefully: This station is now leaving the air. During the CONELRAD alert there will be no FM or TV programs. The only program on the air will be on your standard radio at 640 or 1240 kilocycles, beginning after a short period of silence. Be patient. Tune the dial of your standard radio receiver to 640 or 1240."

If you are *not* listening to a radio or TV set when this announcement is made, you will know the CONELRAD system has gone into operation when you hear the civil defense sirens or attack warning signals . . . Tune your AM (Standard) radio immediately to the proper dial setting—640 or 1240—and listen for the official broadcast.

REMEMBER: *When An Alert Sounds, All Normal Broadcasts Will Cease*

After a short period of silence, CONELRAD stations will return to the air at 640 or 1240 kilocycles on your standard AM radio. This off-the-air period is due to necessary broadcasting-equipment changes. It will vary for different areas. Contact your local civil defense director for the approximate time lapse in your area.

What Is Conelrad?

The system is officially entitled "Plan for CONtrol of ELectro-magnetic RADiation"—CONELRAD for short. It is a system devised by the broadcasting industry and the

Government, working together to bring you official information and civil defense instruction in times of emergency.

Why Do We Need Conelrad?

Without it, enemy bombers could tune their direction finders to a station broadcasting in a target city and "beam" right in on their targets. To prevent this from happening in World War II, all stations went off the air—just when lifesaving civil defense information and instructions were vitally important to the people under attack. CONELRAD stations continue to operate, even under actual attack conditions, and still deny enemy bombers this navigational aid!

How Does Conelrad Work?

When CONELRAD goes into operation, *all* stations first sign off the air with a standard alert announcement. The stations of the CONELRAD system then reduce power and change their broadcasting frequency to 640 or 1240 kilocycles. Then they *return* to the air.

CONELRAD stations in each city join in a "cluster" of three or more stations. These "cluster" stations broadcast a common program. One station in a "cluster" is on the air for only a few seconds. Then another cluster station picks up the *same* program as the other station leaves off.

You will hear a *continuous* program without interruption, although the volume may vary as the program is "switched" from a station near you to one at a more distant point. However, by turning the volume up until you can plainly hear the weakest station, you should always receive a continuous and uninterrupted program.

The effect of this "switching" on a hostile bomber direction finder is to make it swing erratically, so that it cannot "fix" or "home" on a single station.

With many CONELRAD stations in operation, all on 640 or 1240 kilocycles, this completely confuses the "homing" capability of the finder. Many tests conducted by our own Air Force have proved that the CONELRAD system eliminates broadcasting as a navigational aid.

What Else You Should Know About Conelrad

First, CONELRAD is the only safe broadcasting system yet devised to keep you informed of important civil defense instructions and news without helping enemy bombers find their targets.

Second, CONELRAD may be used in one of two different ways, depending on your location:

1. *Continuous Method*

   If you are in or near a large city, you will hear a continuous program of civil defense instructions and reports at 640 or 1240 kilocycles, or both, during the CONELRAD operation.
2. *On-Off Method*

   In some smaller communities where only one station is in the CONELRAD system it will broadcast at either 640 or 1240 kilocycles for a short period, then be off the air for a period of minutes. This on-the-air, off-the-air pattern will continue until the end of the alert.

What If You Hear No Broadcast?

Due to the reduction in transmitting power and the use of two common frequencies (640-1240 kc.) throughout the nation, interference between stations may limit coverage obtainable in some suburban and rural areas. If you are in such an area, your radio may go silent or interference may prevent you from distinguishing the civil defense message being broadcast. This problem is being studied jointly by the Government and the broadcasting industry.

What Conelrad Means to You

CONELRAD will give you civil defense instructions and information that may mean the difference between life and death for you and your family:

Warning: CONELRAD will go into effect simultaneously with the first warning from the Air Defense Command.

The surest, safest way to *know* what to do when you hear the sirens is to tune to your CONELRAD station at 640 or 1240 on your AM radio dial.

Shelter: Your local civil defense director may order you to take shelter if immediate attack is threatened. Only CONELRAD can bring you instructions in your shelter. A battery-operated portable radio with an outside aerial is your best insurance. (Local power may fail.) On all new sets the CONELRAD frequencies of 640 and 1240 are marked. Find out which frequencies will be used in your city. It may be both. If your set isn't marked, mark it NOW!

Evacuation: Your civil defense director may order an evacuation of your city when attack threatens. The order will come to you by CONELRAD as well as the public outdoor warning sirens and from Police and Civil Defense Officers. CONELRAD will supplement warnings with full instructions. If evacuation is by car, keep your auto radio tuned to CONELRAD for the latest instructions. Information on routes, assembly areas, and the imminence of attack can be flashed to you instantly as you travel. Although the reduced transmitting power of CONELRAD stations may make reception erratic beyond 25 miles, reception within this distance should cover most evacuation routes and reach into most assembly areas. Plans for public emergency broadcasts along evacuation routes and the "fringe" areas are being developed.

Fallout: Because of the heavy amount of radioactive fallout produced by large atomic and hydrogen bombs, your civil defense director may order you to take shelter or evacuate an area even though your own city may not have been bombed. Areas lying down-wind from a bombed city may become contaminated. Even if you have just been evacuated from your city, you may have to take shelter or re-evacuate to another area out of the fallout pattern. CONELRAD will bring you this vital information.

BASIC RULES

1. Learn the warning signals, what they mean, and what you should do after each one has sounded.
2. Familiarize yourself with your Community Plan for Emergency Action. The best way to do this is to enroll in Civil Defense.
3. Commit to memory the numbers of 640 and 1240, the channel numbers of CONELRAD, and know exactly when and how to use CONELRAD.

Remember! Conelrad Will Broadcast:

Pre-attack information and instructions. Where to go. What to do. When to do it.

Evacuation instructions, directions, routes and assembly areas.

Warning when to take shelter. When actual attack is imminent. When it is safe to come out of your shelter.

Fallout information and instructions. Where fallout is expected. When it is expected. When it is safe to return to an area or come out of your shelter after the danger of fallout has passed and the radioactivity has dropped to safe levels.

National information of top importance. Broadcasts from the President and other national and state leaders of vital interest to you.

CHAPTER 4

HOME EMERGENCY PREPAREDNESS

Now we come to the situations where you may be entirely on your own, and where anything you do in advance to train and equip yourself to meet such a situation, may literally be the direct means of saving your own life and the lives of those dependent on you.

If you are the head of a family, you are, of course, fully aware of your responsibility to take all available means to protect its members. You should certainly be the prime mover. But this does not mean that you alone should have the necessary know-how to survive. All adult members, and even the older children should share in that knowledge, and should receive all the training they are able to assimilate, so that if one member is absent from the house when an attack comes, the rest can carry on.

One of the best ways to provide for this is to set up a program of "Family Action." As you become familiar with the various preparatory measures described in the following pages, discuss them with your family group. Let everyone be thoroughly conversant with what must be done when the emergency arrives. Practice together step by step the exact procedures you will take when the alert sounds; and determine precisely what will be done, and by whom, when you take cover. Provide as soon as possible for an adequate prepared shelter, but until you do so, decide where the safest place in your home is located and make sure that all members of the family are instructed to go there immediately on hearing the Take Cover Signal.

Learn the essential rules of home fire prevention and make sure that the whole family knows them and the methods of fighting home fires. Householders in England, many of them women, successfully fought fire in World War II. In some cases bombs started fires in every house on a street, yet every house was saved by the local householders. In one town, 150 small fires were started by one air raid. Onlv two grew so big that the regular fire-fighting services had to deal with them. Make sure that every person in your household knows at least the basic measures to take to extinguish a fire, for nuclear blast creates fires.

The section on Fire Fighting for Householders gives adequate instructions, but if you wish, you can get training in home fire fighting through your civil defense organization.

Then learn what emergency action can be taken to treat the injured and to save lives. Here again this manual will tell you a lot, but to learn *more,* have at least one member of your family take a complete first-aid course of the kind given free by the American National Red Cross or the U. S. Department of Interior, Bureau of Mines. This can be further augmented by following up with the American Red Cross home nursing course.

Decide who should represent the family in each of these areas of specific training, so that he or she can take the course and then train the other members of the family in at least the vital essentials.

In short, make every phase of your own program for survival a family project, and whatever you learn that can be of importance to that program, make sure you share your knowledge with someone else in the family.

Within your own four walls, you are, when emergency strikes, your own Director of Civil Defense.

FIREFIGHTING FOR HOUSEHOLDERS

Getting ready to fight fires is a big part of the civil defense job. After a nuclear bomb explodes, the resulting fires could cause more loss of life and property than the blast itself. There would, of course, be great fires adjacent to the area of impact, but there would also be hundreds of small fires started in surrounding areas. These smaller fires must be fought by people on the spot, because the regular fire-fighting companies will not be able to reach them. Since women are at home much of the time, it is particularly important that they know how to fight fires.

Here again, preparation in advance can substantially diminish the chances of fire loss. It is not entirely sufficient to know how to fight a fire. A great deal can be done toward minimizing the probability of fire and greatly increasing the ease with which it can be put out, if a definite program of fire prevention is pursued.

HOW BOMBS CAUSE FIRE

The effects of a nuclear explosion are spread by three forms of energy—heat, blast, and radiation.

The heat flash is over in a matter of seconds, but it is hotter than the surface of the sun and it lasts long enough to set fire to exposed paper, cloth, rubbish, and dry wood over a large area, including a distance of several miles.

Immediately following the heat flash comes a tremendous blast wave. The pressure, even in the outlying areas, not only blows in windows and doors, but it also knocks down chimneys, wrecks stoves and fireplaces, and causes breaks in electric wires and gas pipes, which may start other fires.

Although your neighborhood might not be directly under the bomb, an atomic explosion could start dozens of small fires in and near your home. Statistics show that these fires are more likely to kill you than the bomb itself. So every effort you make, every measure you can take to eliminate fire hazards, can go a long way toward minimizing the possibility of fire.

FIRE IS ALWAYS AN ENEMY

Fire costs more than 10,000 lives and a billion dollars in property damage in the United States each year—even in peacetime. Knowing how to put out fires can pay dividends even if we have no war, since fire is always an enemy. In time of war, this knowledge could save your home, your neighborhood, even your city.

No one can forecast just where the bombs will fall, or just what types of weapons will be used if the United States were attacked. We do know that whether the weapons are H-bombs, A-bombs, high explosive bombs, incendiary bombs, or guided missiles, fires will be one of the greatest dangers to life and property.

All the knowledge and all the planning in the world cannot save your home if it is within the area of complete destruction from a nuclear bomb explosion. You may be sure that if your city is evacuated in the face of a threatened attack, you will not stay behind to save your home. *But it is important that you leave it in a fire-safe condition.* You can only hope that it is outside of the area of complete destruction. If it is, elimination of fire hazards will make it less likely to burn. A few precautions might well determine whether or not you will have a home to return to when you come back.

Since you cannot know where a bomb will strike, or if there is a pre-attack evacuation, you *must* be prepared to meet wartime fire hazards. Mere proximity does not determine your exposure. Nuclear blast can cause fires in flammable material as far as fifteen miles from the point of origin.

Even under the most favorable circumstances, organized fire departments could not handle all the small fires. It would be their job to control the main blazes so that rescue teams could reach injured or trapped people who otherwise would burn to death.

If your city is not evacuated at the time of attack and your home is located in the fringe area of damage, your job would be to fight fires in your own neighborhood. Knowing how to fight fire could save your life, and the lives of your family.

Training, tools, and plenty of practice drills are the basis for good fire defense. You can get training in home fire fighting through your local civil defense organization. At least one member of your family should receive this training, then pass on to the others what he has learned.

Fire fighting drills should be held by your family. Give detailed duties to each member so that all learn to work as an efficient team. Switch places from time to time to learn all the jobs. Meanwhile, be sure everyone in your home understands what starts fires, how they spread, and what can be done to control them.

What Makes a Fire?

If you know what makes a fire, you can learn more easily how to prevent one from starting—and how to put it out. Three things are needed for a fire. They are (1) fuel to burn, (2) heat to make it burn, and (3) air to keep it burning.

A kitchen match is a good example. When you strike it the head flares hotly for a moment, setting fire to the matchstick, which is the fuel. The oxygen in the air then keeps the match burning.

If you drop the lighted match into a small bottle and put your hand over the opening, the flame soon will smother for lack of air.

Quicker still, dip your lighted match into a glass of water. It will go out at once. The water has cooled the fuel so that the flame no longer can make the match burn.

Most small fires can be put out by cooling or by smothering. As a rule, burning liquids such as gasoline or grease are smothered. There is little difference between throwing a handful of soda into a blazing skillet and using chemical foam to blanket an oil tank fire. The results are the same. Both fires go out for lack of oxygen.

Burning solids like wood, cloth, or paper are best cooled with water. Turning your garden hose on a trash fire has the same effect as pouring water into a blazing building. The fire goes out in either case because of the cooling effect of the water.

How a Fire Grows and Spreads

Fire spreads from one material to another, and from one place to another, in three different ways. It can be conducted by something like sheet metal, which by itself will not burn, but which may get hot enough to set fire to anything it touches. That is why stove pipes should not be allowed to come in contact with woodwork.

Or, fire can be carried by flying sparks or drafts of hot air. Firemen often find that a fire on a lower floor has made hot air rise through stairways or elevator shafts. This superheated air often gathers at the top of the building and makes it burst into flames, although there may be no fire on the floors between.

Finally, the radiation of heat from a burning building may cause a nearby building to catch fire, just as the heat from a bonfire might set fire to your clothes if you stood too close to it, even though the flames couldn't reach you.

FIRES CAN BE PREVENTED

Most accidental fires can be avoided with a little care. Firemen have a saying that "a clean building seldom burns." This means that the majority of all fires start in trashpiles, rubbish, or stored odds and ends that accumulate around the house. Closets, attics, and cellars are the main source of home fires, and plain ordinary good housekeeping is the first line of defense against such fires. Civil defense housekeeping is clean housekeeping.

Fire hazards in peacetime become doubly dangerous in wartime. Check your closets, attic, and basement for castoff articles that would burn easily. They include such things as curtains, draperies, tablecloths, bedclothes, lamp shades, coats, suits, dresses, wicker and wooden furniture, rags, and linoleum.

Clean out your storage places. You will be surprised at how many burnable odds and ends are really useless to you. Don't let them make your home a fire hazard. Get rid of them. If local welfare agencies can't use them, call the junkman.

Don't stop when you've cleared out the inside of your house. Go after the rubbish in your back yard, in alleys, and in vacant lots near your home. Collect the rubbish and burn it. Don't leave it around to burn if any enemy bombs your neighborhood. Be sure to burn rubbish in metal containers.

Instead of an attic, many modern homes have an air space between the top floor ceiling and the roof. If your home has such a spot, make sure you can get into it through a trap door. Keep a ladder handy. You won't be able to put out a fire in this space unless you can reach it quickly. Never store anything there.

Whenever you leave your home you can improve its fire resistance by shutting all doors and windows. *Closed interior doors* will confine a fire to the area of origin for some time and prevent rapid spread within the building.

Check Your Wiring System

Many electrically caused fires happen in homes every day, most of them simply because people are careless. They overload circuits by plugging in too many appliances to a single outlet. They switch on an iron, then go away and leave it. They use old wornout cords and stretch them under rugs, or staple them to baseboards and door frames. They string wires all over the house.

Don't let such things happen in your home. Take a look at your electrical system. Buy new plugs and cords if yours are worn. It is wise to get advice from an electrician if your fuses blow frequently. They may be dangerously overloaded. His advice may prevent a bad fire.

Be Sure Your Heating Plant Is Safe

Every winter costly fires are started by faulty furnaces, stoves, and other heating plants. Some result from too much soot in chimneys. Others are caused by rusted or cracked pipes and fittings. Look over your heating system now. If your chimney needs it, clean it out. If the furnace pipes and connections are cracked and rusted, replace them.

Train your family not to put magazines, papers, or clothing on radiators or near open fireplaces or stoves. Do not allow paper lamp shades to come in contact with light bulbs. Remember that such things don't have to touch flame to burn. They will catch fire simply because they are too close to the heat for too long.

Fire-Proofing Materials

You can't make materials completely fireproof, but you can make many of them fire-resistant. That can be done by treating or coating them with certain chemicals. Some fabrics are treated at the factory where they are made.

You can buy fire-resistant drapery and furniture-covering materials. Or you can mix a fire-resistant solution for rayons and cottons yourself. It's cheap and easy to use, and it works.

Just dissolve nine ounces of borax and four ounces of boric acid in a gallon of water. Dip your curtains, drapes, and slipcovers in it. This solution won't hurt anything that water won't hurt. You'll have to use it again each time you wash the fabric, however.

It is important to remember that materials treated with fire-resistant chemicals will burn if they get hot enough. The chemicals just make it a little harder for them to burn.

Even "fireproof" buildings aren't really fireproof. Some are fire-resistant—which means that the structures themselves will resist fire. But their contents will burn. And if the rugs and furniture and draperies in a home or office go up in flames, the building will be weakened no matter how strongly it is built. Glass, steel, and even concrete break down when exposed to great heat.

Store Fluids Carefully

Gasoline, benzine, naphtha, and similar fluids should never be used indoors. When mixed with air, their vapors can be ignited by the spark of a light switch or an electric fan, or the tiny flame of a pilot light. Keep such fluids in tightly closed metal containers outside your home.

Oil-soaked rags, especially rags that have been used to spread quick-drying liquids such as turpentine, paint thinners, and some furniture polishes, have been known to catch fire by themselves. This happens when there is enough air to provide oxygen, but not enough air to carry away the heat that is caused when they give off vapor. When those vapors get hot enough, they burst into flame. Oily rags should be stored in air-tight containers. It is best to keep them outside the house.

KNOWING HOW TO FIGHT FIRE IS ONE OF THE MOST IMPORTANT JOBS

Fire, not blast, caused 80 percent of the bomb damage in World War II. Fires killed more people in Germany than the explosions of the blockbusters. Fire did the same in Japan after Hiroshima and Nagasaki.

Training, tools, and plenty of practice drills are the basis for good fire defense. Fire fighting drills can be and should be held by your family, and each member should have detailed duties so that all learn to work as an efficient team. Remember, you may be entirely on your own—this is a do-it-yourself project.

Your Fire Fighting Equipment

Regardless of the possibility of evacuation, you will need fire fighting equipment, but not expensive special equipment, to fight fire in your home. The simplest kind of tools will do the trick if you act promptly. Even a wet mop or broom will serve. So will a burlap bag or small rug soaked in water. However, the most useful fire fighting tools are a garden hose, a hand pump, and some buckets for water and sand.

Because water is your best simple weapon against fire, you can't have too much near at hand. After a bombing, the organized fire fighting services will need large quantities of water, and with possible breaks in the water mains also cutting down the supply, this might leave very little water for homes.

You should have at least the equivalent of a barrel of water stored at all times, if you live in a house. If you are an apartment dweller, allow yourself at least one filled bucket for each two rooms.

Keep your buckets filled to the top and covered. Don't wait to draw water until after an alert sounds. If everyone did that at the same time, the pressure in the mains would be seriously reduced. Put the buckets in various handy places on all floors of the house.

You will need a hand pump to make best use of the water you have stored. The pump could be part of a hand water-pump extinguisher, or a separate pump for use with any kind of water container.

A hand water-pump extinguisher holds four or five gallons of water and is easy to refill. This type is best operated by three people; one to use the hose, a second to pump, and a third to bring up additional water. However, two persons could operate it, one to handle the hose and pump, while the second acted as water carrier.

Hand water pumps without containers can be used with almost anything that will hold water. They are light and easy to carry. Any of these devices should have a nozzle that will shoot either a spray or a solid stream of water.

Be sure your garden hose has a connection that will fit the faucets you have to use. The usual hose coupling will not go on your kitchen or bathroom faucets, so get adapters.

A hose doesn't take the place of a hand pump, because you cannot be sure the regular water supply system from city pipes will be functioning after an air raid. A hand pump and a stored water supply is certain. Test your equipment at least every two weeks. A rusty pump or leaky hose won't be of much use in time of need. If you have chemical fire extinguishers, keep them filled, and know how to use them. They are good for putting out small fires, but cannot be refilled easily during an emergency.

Should a magnesium fire bomb fall on your home or nearby, you would probably have most of the tools around the house for disposing of it. These would include a long-handled shovel, heavy gloves, and a coal scuttle or metal bucket. One of your sand buckets would do. Later on you will read how to fight fires caused by magnesium bombs.

A Ladder is a Tool for Fire Fighting

A ladder is a useful piece of household fire fighting equipment. If yours is not in good condition, either repair it or get a new one. An unsafe ladder is worse than none at all. It may fail you or injure you when you need it most.

Keep your ladder in good repair. Don't leave it lying on the ground or standing against a wall. Fasten pegs or metal hooks to a wall and hang it up, preferably in the garage or some place under cover.

When need arises, use it safely. Set it so that the foot of the ladder is about one-fifth of its length away from the wall against which you have placed it. In other words, the bottom of a 20-foot ladder should be about four feet away from the wall it is leaning against. If you have time, tie the ladder at the top or bottom to keep it from slipping.

In climbing a ladder, the balls of your feet should be placed in the center of the rungs. Your body should be held erect. Keep your upper body at arms length from the rungs and don't look down. Lift your right hand and right foot together, then the left hand and foot.

If you need to free both hands for work while standing on a ladder, brace yourself with a leg-lock. Hook one knee over the rung above the one you are standing on. Then bring your foot back and hook your toes around the lower rung or side rail.

How to Fight a Fire

If you are in or around your home after an enemy attack, check to see if fires have started in it. Be sure to check the attic and the roof. If you have more fires than you can handle, call for help.

Don't wait for help to arrive. Assume that it can't. Go to work quickly with the tools at hand. If the organized fire fighters can come, they will, but don't stop fighting until the fire is out—or until it gets too big for you. Any delay increases the fire's chances of getting out of control.

If you are lucky enough to have no fires in your own home after an attack, you may be able to help someone else who has a fire to fight.

Remember there are three ways to put out a fire. It will go out if you remove its fuel, or rob it of air, or if the burning material is cooled below its combustion point.

If the burning material is removable, take it out of the house. Then kill the flame with water, a fire extinguisher, sand, or dirt. If the burning material can't be removed, get as close to it as you can safely and douse it with water or whatever fire-fighting material you can use. Keep the area around the fire cooled with water to prevent it from spreading.

A small fire can be smothered by a rug or any other heavy material. If the material is wet, so much the better.

You might have to deal with incendiary bombs, especially magnesium bombs like those which caused so much damage to cities in World War II. These sputter for a few minutes, then settle down to a steady burning. This type makes a lot of smoke, so keep close to the floor in fighting it. Keep something between yourself and the bomb as you approach it. Some fire bombs contain a charge which blows up several minutes after it starts to burn. Use a piece of sturdy furniture or something made of metal as a shield.

Take your water pump or your garden hose with you. The best way to fight a magnesium fire is first to spray it and the area around it with water. Don't use a solid stream of water at first—it will only scatter the fire. As soon as the bomb stops sputtering, turn the full stream of water on it. If you have no water, throw a shovelful of sand or dirt directly on the bomb.

If you can reach the incendiary bomb with your long-handled shovel, scoop it up and drop it into a coal scuttle or metal bucket that has an inch or two of sand in the bottom. Then carry it outside and dump it on the ground.

Watch out for other fires in the neighborhood that may spread to your house. If your house is made of wood and is near other houses that are burning, you must be alert. The walls and roof nearest the flames should be kept wet with a hose or buckets of water. All flying sparks that land where they can set fire to your property should be doused or smothered quickly. If your house is of brick or stone, watch door and window openings. Pull down curtains and draperies and cool the frames with water.

The distance between your home and your neighbor's is important. In World War II only a 10-foot space between solid masonry buildings gave a fifty-fifty chance of preventing fire from spreading from one to another. A distance of 50 feet is needed between wooden houses to reduce the chances of a fire spreading. This does not mean that the fight is hopeless if your frame house is nearer to a burning building. It means you will have to work harder to save it.

You May Have to Run From a Fire

If you can't control a fire, get away from it before you are trapped. If you have to go through thick smoke to get out of your burning home, tie a handkerchief or cloth over your mouth and nose. Moisten it if you can. Crawl on your hands and knees.

Find a wall and follow it around to the door. Keep away from the center of the floor. It is likely to cave in first if there is fire below. If someone else is in the room and can't find his way out, shout to him from the doorway. You may be able to guide him to you.

Be careful of stairs in a burning building. Keep close to the wall and tread lightly. Don't run. Feel with a foot for each step to make sure it will bear your weight before you step on it.

If you can't get down the stairs, you may have to drop from a window. You can cut your fall by about seven feet if you lower yourself out of a window as far as you can before letting go.

If you are caught on a second or third floor, tie sheets or blankets together with square knots. Tie one end of your improvised rope to a heavy piece of furniture. Drop the other end out the window, and climb down hand over hand. Your make-shift rope may not reach the ground, but will get you that much closer to it. You can then drop the rest of the way with less chance of hurting yourself.

If you decide that you can't escape by yourself, shut the door and call for help from a window. A closed door will hold back the heat and flame for some time. Stuff a folded rug or towel under the door to keep out smoke.

Rescue Tips

Take someone with you when you search a burning building. Team work is always better. You can search more quickly and thoroughly and you can help each other if necessary. Try to search from the top downward. People who are confused or frightened, especially children, often hide under beds or in closets. Look in every room and in every hiding place you can think of.

If a door is hot to the touch, you can expect to find fire when you open it, so be careful. If the door opens toward you, brace your foot against it and turn the knob gently. An explosive back draft may occur when you open the door. If the door opens away from you, turn the knob, push, and duck to one side until you can see whether flames are going to lash out through it.

Inside a smoke-filled room, keep close to the wall and feel under and on the beds, inside closets, and over large pieces of furniture. If you think the floor won't collapse, cross the room from one corner to another to make sure no one is lying in the center.

If you find an unconscious person, put him on the floor if he isn't already there. Turn him on his back and quickly tie his wrists together. A handkerchief will do. Kneel astride him and put your head between his tied wrists. You can then crawl forward, dragging him beneath you, even though he is much heavier than you are.

To move an unconscious person downstairs, place him on his back with his head toward the stairs. Put your hands under his armpits so that his head rests on the crook of your arm. Then back down the stairs yourself, letting his feet trail.

Dangers in Fire Fighting

Air in a burning building may be dangerous. Many of the gases given off by burning materials are poisonous. Fire sometimes can heat the air in a burning building hot enough to scorch the lining of your lungs and kill you. Fire takes oxygen out of the air. If you were caught in a closed burning room for any length of time, you might smother.

Sometimes a fire may smolder for a long time in a closed building or room. When a door or window in the building is opened, the oxygen needed to make it flame is supplied by the inward rush of air. The hot gases may flare up with the force of an explosion. This back draft can burn or injure you badly if you are in its path.

Like all dangers, those in fire fighting take courage to face, but all of them can be met if you use care and common sense. The greatest danger of all comes from losing your head. That danger can be avoided by training and practice. If you are trained in the right things to do, you will do them if the need arises.

CHAPTER 5

EMERGENCY ACTION TO SAVE LIVES

FIRST AID

If you have not yet had first aid training, here are a few important ways to help the injured. But let's make one thing clear: This section is for *emergency action only*. It will not turn you into a trained first-aider. It does not take the place of competent medical treatment by a physician. The injured person will still need attention from a trained first-aider after you have taken these emergency actions, and he may need further treatment by a physician at the earliest possible moment.

Neither does it take the place of a complete first aid course of the kind given by the American National Red Cross.

It may, however, serve to keep an injured member of your family alive until help arrives.

There are six emergency actions described in this section which are practical ways of saving lives. They are:

1. Keeping an injured person from bleeding to death.
2. Helping people with bad burns.
3. Helping to prevent the dangerous condition which doctors call "shock."
4. Doing the right thing about broken bones.
5. Preventing suffocation.
6. Handling injured people properly.

But let's stress again that knowing how to do these six things does *not* make you a first-aider or eliminate the need for proper medical treatment.

Only a good, complete first aid course can prepare you for real first aid understanding and make medical care easier and more successful later.

Don't Lose Your Head; Don't Delay Proper Medical Treatment by a Physician

A quick way to endanger the life or increase the suffering of a wounded person is to rush into action without knowing what to do or how to do it. First, decide if emergency action is necessary.

Even if emergency action is needed, don't move the patient. The only reasons for moving him would be if he is in danger of losing his life anyway from fire, flood, or similar danger.

One way you can tell about a victim's condition is to look at his face. If it is red he may have a skull fracture or serious head injury. If his face is white, he may be suffering from shock. This can be caused by bleeding, burns, broken bones, crushing injuries, or by extreme nervous tension or fright. Shock frequently causes fainting. If his lips and finger nails are blue, he may be suffocating or he may be in shock.

If the injured person is bleeding very badly, if he is badly burned, is in shock, has broken bones, or is suffocating, then you may have to take emergency action.

But make sure it is a real emergency before you act. If the wounded person is *not* in danger of bleeding to death, or is *not* suffocating, or has *not* been severely burned, or is *not* in shock, it is better for the untrained person to do nothing. Clumsy attempts to help the victim may only make matters worse.

Sign up for Red Cross first aid training right now. Then you won't feel so helpless when someone gets hurt.

You also should have a civil defense home first aid kit and know how to use it. On the first aid check list in Appendix C, page 296, are the things your home first aid kit should contain.

How To Stop Bleeding

If a person is bleeding, remove only enough clothing to see and reach the wound. Cut or tear the clothes, if necessary, to avoid giving the victim more pain. Be sure you find all wounds.

Don't move the patient except to reach the wound. Don't try to clean the wound before you dress it; you may rub even more dirt into the injured tissue and cause an infection.

The most dangerous kind of bleeding is that in which bright, red blood flows from a wound, usually in regular spurts. When you see such bleeding, it usually means an artery has been cut. Unless bleeding from a large artery is stopped quickly, the victim will die.

Another kind of serious bleeding is that which comes from the veins. In this case darker blood wells out of the wound, usually in a steady flow.

The way to stop serious bleeding is first to get the victim quiet, lying down. Next, if you know how, you may put pressure on certain veins and arteries. But these "pressure points" are something you must learn about in a regular first aid course. When you don't know about pressure points, emergency action to take is this:

Try to stop the bleeding by pressing a pad of cloth directly on the wound itself. Towels, sheets, or anything else at hand can be used for emergency pads.

If possible, use clean cloth. If not, use what you have. You might hesitate to use some cloth that does not look too clean. You would be wrong. Modern medicines stop many infections after they start. It is better to risk infection later than have the victim bleed to death right then and there. Make up a good wad or pad of cloth and force it against the wound. Bind it in place. If the bleeding doesn't stop, use more pads and more pressure.

You may have heard about tourniquets to stop bleeding in arms and legs. Unless you are a trained first-aider, don't use one. A tourniquet that is not properly used can do more harm than good by crushing tissues and nerves and cutting off the blood supply. If you want to know how to use a tourniquet, take a first aid course. If you don't know how to use one, use the pressure-pad method.

If the victim has an abdominal wound, put him on his back with his knees propped up, and cover the wound with a clean cloth which has been dampened in water. Do not give him *anything* by mouth.

If the victim has a chest wound, his breathing may be seriously impaired. The wound might suck air. It should be covered with a dry pad.

The point you must keep in mind is this: The important thing is to stop the bleeding. Direct pressure on a wound very often will do the trick. It may not be the best way, but it is a good emergency action for untrained people to take. There is a good chance that it will keep life in the wounded person until more expert help can arrive.

Handling Badly Burned Persons (Illustration, p. 92)

There are more "don't" than "do" rules to remember in the handling of bad burns.

Don't use grease, oil, water, or anything else on a bad burn. This doesn't mean that ointments and salves never are suitable for treatment of burns. That is for a physician to decide. If you guess wrong and use the wrong kind of treatment, you may make it almost impossible for the physician to change to the right kind for that particular burn. Use of an ointment may force the physician to remove whatever you have put on the burn before he can proceed with his own treatment.

Lay the burned victim down and keep him quiet. Don't remove any more clothing than necessary. If clothing sticks to the burn, cut around it—don't pull it off. Don't try to clean the burn and don't open any blisters.

Here's the right thing to do: cover the burned area with a clean dry compress or pad of cloth, if civil defense burn pads are not available. You can use strips torn from a sheet, a shirt, a towel, a pillowcase, or anything else that may be at hand. Have them clean if possible. Use several layers of cloth, arranged smoothly, to make a pad. Cover every part of the burn.

Hold the pad snugly in place with a bandage. Don't apply a tight bandage, but make it snug enough so air will have a hard time getting under it. If you have plenty of material, make the bandage good and thick. Once the bandage is on, don't disturb it. Let it alone until a physician can treat the burned person.

Give the victim plenty of water to drink with salt and baking soda added. Mix a half teaspoonful of baking soda and one teaspoonful of salt into each quart of water. This will help prevent shock. Encourage the victim to drink plenty of this solution. A burned person might take six or seven quarts of this fluid, and sometimes more in 12-14 hours.

Do not give this or any other solution to unconscious or semiconscious people, nor to people with extremely severe burns in which half or more of the body surface is burned. In such cases vomiting the solution may cause strangling.

Handling Broken Bones (Illustration, p. 93)

You can often tell a broken arm or leg because it is bent or turned in a way that does not look right. Just as often, however, there is no outward sign of a broken bone until you move the patient.

If the victim cannot move the limb, he may have a broken bone. Movement of the part usually is painful. There may be tenderness and swelling at the point of break, and there also may be a rough edge of bone that you can feel with your fingers. A grating sensation when the limb is moved is a sign of a broken bone. Sometimes the ends of broken bones stick out through the skin.

Don't try to set the broken bone. Don't try to push back pieces of bone that may be sticking out of the skin. Don't handle the break roughly or carelessly—in fact, don't handle it at all if you can help it. Wait for medical help or an experienced first-aider.

Always remember that moving a patient with a broken bone may cause the jagged bone end or bone fragments to poke around and do serious damage to flesh, blood vessels, and nerves.

A broken bone, in itself, is not usually a great threat to the patient's life. It can become so if he is not cared for properly. One of the bad results of broken bones comes from shock caused by injury. Shock can be serious and it can be brought on or increased by moving the patient improperly. Shock is discussed in the next section.

If it is absolutely necessary to move a victim with a broken bone, there is an emergency action you can take. The action consists of putting on a splint.

A splint is any object which can be applied to the victim so that the broken bone ends cannot move. It usually is a board or piece of wood of the right length and width, but in an emergency, it can be anything from a thick bundle of folded newspapers to a broom handle. Splints should be long enough to reach beyond the joints above and below the break. Pad the splint heavily to make the patient more comfortable. Do this by wrapping the splint in cloth.

The way to apply a splint is to lay it alongside the broken arm or leg, then tie it snugly in place above and below the break. Tie it in enough places so the broken bone cannot move. Do not tie too tightly, otherwise you may cut off the blood supply or injure the nerves. Put padding under the ties all the way around the limb.

Broken bones in the hand, arm, shoulder or collar bone require support in addition to splinting. You can provide support with an emergency sling when no triangular bandage is at hand. Place the victim's forearm across his chest and pin his sleeve to his coat. In this way the lower sleeve will take the weight of the injured arm. Or pin up the lower edge of his coat or shirt to get the same result. A scarf, towel, or diaper makes a good emergency sling. So does a wide strip torn from a sheet. Anything to make a triangular bandage would be all right.

A person with a broken neck or a broken back will need expert attention. Do not try to move such a person unless you must do so to keep the patient from drowning or burning to death. Attempts may result in injury to the spinal cord, and paralysis or death.

If you do have to move him, slide him as gently as possible onto a litter, a heavy board, or a door which you have taken off its hinges. Take him only far enough away so he is no longer in danger, then let him alone until trained help arrives.

Good first aid training is necessary before you can take care of broken bones properly. You can get such training right in your community. Take a Red Cross first aid course. You owe it to yourself and your family.

Handling Shock (Illustration, p. 94)

The word "shock" as used in the medical sense, usually has nothing to do with electricity. The kind of shock you must know about is the kind caused by injury. Usually the victim becomes pale. His skin may be cold and moist. His pulse usually becomes rapid (over 100 per minute). He may become wet with sweat and he may faint.

Severe shock brings unconsciousness. If the shock is very deep, it can produce death. Severe shock should be treated by a physician, but you can take emergency action while waiting for him to arrive.

Some degree of shock will result from burns, broken limbs, and other wounds. The shock may be serious, or it may not. The safest thing to do is to assume that it may become serious.

The first steps in handling shock are to make the patient lie down, and to wrap him warmly. Try to keep a victim from seeing his wound. Stop bleeding, splint broken bones, and apply dry dressings to severe burns. Use whatever you have at hand to keep him warm, but don't let him get overheated. If the patient perspires too much, his condition will get worse. Wrapping in blankets, of course, is easiest and best. If blankets are not available, use a coat, drapery, rug, or anything else you can find.

The victim's head should be level with or lower than his body. However, if you see there is a head injury, have the head slightly raised.

If the patient is able to swallow, remember there is a solution that you can make yourself of water, salt, and soda which will help to prevent or delay the appearance of severe shock. It is especially good for victims of mild to moderate burns. It must be mixed in the right proportions, and it must not be given if the patient cannot swallow.

To make this liquid, stir one teaspoonful of salt and a half teaspoonful of baking soda into a quart of water. A quart milk bottle will do for a container, and it is easy to drink from. Give the victim as much as he is willing to take.

It would be a good idea in preparing your first-aid kit to measure out the right amounts of salt and soda into moistureproof envelopes before hand. Then you will need only to dump the contents of the envelopes into quart bottles of fresh water, if they should be needed.

Do not attempt to give anything by mouth to a victim who is vomiting, semiconscious, or in very severe shock. The liquid may get into his windpipe or lungs and cause him to strangle. Do not give anything by mouth to a person with an abdominal wound.

Handling Suffocation

Suffocation can result from pressure on the neck or chest, as when the victim is pinned down by wreckage. It also can be caused by breathing in dust, dirt, food, liquid, smoke, or gas. Contact with a live electric wire may paralyze breathing. Drowning persons are victims of suffocation.

The usual signs of suffocation are coughing and sputtering or other difficulty in breathing. Then breathing stops. The victim's face may turn purple and his lips and finger nails may become blue. He soon will become unconscious unless you act quickly.

The first emergency action to take when a person is suffocating is to get him away from the cause of his condition. If he is in contact with a live wire, don't touch him without first protecting yourself. Shut off the current if you can. If not, stand on dry wood or paper and protect your hands with dry gloves or cloth before touching him. Better still, try to pull or poke the wire away from him with a dry stick or rope. This should be done only after making sure the wire will not injure yourself or others.

If the victim is in a room filled with gas, smoke, or water, get him out as fast as you can. Then lay him face down and turn his head to one side. Remove any objects from his mouth and with your finger explore his mouth and throat for any obstruction. Then apply artificial respiration at once. (See page 78 for methods).

If you don't know how to apply artificial respiration, you have one more reason for taking a Red Cross first-aid course right now. In such a course you will not only be told how to give artificial respiration, but you will get practical experience under trained instructors. It is something everyone needs to know and practice.

Moving Injured Persons

Unless you are a trained first-aid worker, the best advice on moving injured persons is—don't. If the victim is in pain, awkward handling may increase his suffering and bring on severe shock. If he has broken bones, moving him around may allow the bone ends to damage the surrounding tissue and nerves. If he has a head injury, or a broken neck or back, any clumsy changing of his position may cause permanent injury or death.

So, if you don't know how to move an injured person, leave him alone. Take a Red Cross first-aid course now so that if an emergency occurs in your own family, or in a neighboring family, you will know what to do and how to do it right.

Of course, if some member of your family is in danger of burning to death, or of suffocating in a smoke or gas-filled room, you will have to move him regardless of his injuries.

In general, your rule should be: He will die if *not* moved—then move him. But remember that the right way to move a badly hurt person is to keep him lying down flat.

This means that you need a litter and someone to help you carry it. If no litter is available, take a door off its hinges or use a wide board. If you use a board, tie the victim to it with strips of cloth so he won't roll off.

If you can get two other people to help you carry the injured person, the three of you can lift and move him for a short distance without a litter. To do this it is necessary to kneel on the same side of the victim and slide your hands under him as gently as possible. Then, with all three of you lifting at once, raise him carefully from the floor. When you stand up, move together as a team. Walk in step so as not to jar the victim any more than you can help. (Illustration, p. 95.)

Never "jacknife" an injured person into a car seat in your haste to get him to a hospital or first aid station. This will only make his injuries worse and may kill him. Instead of trying to drive him to some place where he can get medical help, leave him where he is and send for the help you need.

The main thing to remember is, leave the victim alone unless he is bleeding to death, suffocating, badly burned, or in shock. A wound can be very ugly and still not endanger a person's life. There's only one way to learn the right thing to do and when to do it—take a first aid course.

APPROVED METHODS OF ARTIFICIAL RESPIRATION

Since 1910, the American Red Cross has been directly responsible for saving uncounted hundreds of lives through its resuscitation techniques first taught in classes in first aid. It would be impossible to arrive at any fairly accurate number of lives saved for the reason that so many cases of lifesaving never are reported to the Red Cross.

In an emergency when and where mechanical resuscitators are not readily available, the mouth-to-mouth technique of artificial respiration for both adults and children is officially approved by the American Red Cross. The Red Cross

First Aid Textbook states that mouth-to-mouth respiration dated back to Biblical times.

Manual methods of artificial respiration are considered acceptable for rescuers who cannot or will not use the mouth-to-mouth or mouth-to-nose technique.

However, the Red Cross indicates that in the absence of equipment, this method of artificial respiration is the most practical means of restoring the function of breathing for a person of any age, regardless of the cause of cessation of breathing.

Individuals trained in first-aid do not always have the experience, training or equipment to determine whether breathing cessation is caused by accident or disease. For that reason, some form of artificial respiration should be started at once and maintained until breathing is restored or the victim is pronounced beyond all help. The essential procedure is to obtain and maintain an open air passage from the lungs to the mouth and provide for an alternate increase and decrease in the size of the chest, internally and externally.

According to a unanimous verdict of approval from a committee, the American Red Cross states that the mouth-to-mouth (or mouth-to-nose) technique has the advantage of providing pressure to inflate the victim's lungs immediately. It also enables the rescuer to obtain accurate information on the volume, pressure and timing of efforts needed to inflate the victim's lungs. When a person is not breathing and is unconscious, the base of the tongue tends to press against and block the upper air passageway. The procedures herein described, as developed and approved by the American Red Cross in its manual, "A Supplement on Artificial Respiration," should provide for an open air passageway when a lone rescuer must attempt artificial respiration.

Mouth-to-Mouth or Mouth-to-Nose

If there is foreign matter visible in the mouth, wipe it out quickly with your fingers or a cloth wrapped around your fingers.

1. Tilt the head back so the chin is pointing upward. Pull or push the jaw into jutting-out position. These maneuvers should relieve obstructions of the airway by moving the base of the tongue away from the back of the throat.
2. Open your mouth wide and place it tightly over the victim's mouth. At the same time pinch the victim's nostril shut or close the nostrils with your cheek. Or close the victim's mouth and place your mouth over the nose. Blow into the victim's mouth or nose. (Air may be blown through the victim's teeth, even though they may be clenched.) The first blowing efforts should determine whether or not obstruction exists.
3. Remove your mouth, turn your head to the side, and listen for the return rush of air that indicates air exchange. Repeat the blowing effort.

   For an adult, blow vigorously at the rate of about 12 breaths per minute. For a child, take relatively shallow breaths appropriate for the child's size, at the rate of about 20 per minute.
4. If you are not getting air exchange, recheck the head and jaw position. If you still do not get air exchange, quickly turn the victim on his side and administer several sharp blows between the shoulder blades in the hope of dislodging foreign matter.

   Again sweep your fingers through the victim's mouth to remove foreign matter. Those who do not wish to come in contact with the person may hold a cloth over the victim's mouth or nose and breathe through it. The cloth does not greatly affect the exchange of air.

Mouth-to-Mouth Technique for Infants and Small Children

If foreign matter is visible in the mouth, clean it out quickly as described previously.

1. Place the child on his back and use the fingers of both

hands to lift the lower jaw beneath and behind, so that it juts out.

2. Place your mouth over the child's mouth *and* nose, making a relatively leakproof seal, and breathe into the child, using shallow puffs of air. The breathing rate should be about 20 per minute.

   If you meet resistance in your blowing efforts, recheck the position of the jaw. If the air passages are still blocked, the child should be suspended momentarily by the ankles or inverted over one arm and given two or three sharp pats between the shoulder blades, in the hope of dislodging obstructing matter.

Manual Method of Artificial Respiration

Rescuers who cannot, or will not, use mouth-to-mouth or mouth-to-nose techniques, should use a manul method. The rescuer should not be limited to the use of a single manual method for all cases, since the nature of the injury in any given case may prevent the use of one method, while favoring another.

It has already been pointed out that the base of the tongue tends to press against and block the air passage when a person is unconscious and not breathing. This action of the tongue can occur whether the victim is in a face-down or a face-up position.

The Chest Pressure—Arm Lift (Silvester) Method

If there is foreign matter visible in the mouth, wipe it out quickly with your fingers or a cloth wrapped around your fingers.

1. Place the victim in a face-up position and put something under his shoulders to raise them and allow the head to drop backward.
2. Kneel at the victim's head, grasp his arms at the wrist, cross them, and press them over the lower chest. This should cause air to flow out.
3. Immediately release this pressure and pull the arms

outward and upward over his head and backward as far as possible. This should cause air to rush in.

4. Repeat this cycle about 12 times per minute, checking the mouth frequently for obstructions.

When the victim is in a face-up position, there is always a danger of the inhalation of vomitus, blood, or blood clots. This hazard can be reduced by keeping the head extended and turned to one side. If possible, the head should be a little lower than the trunk.

If a second rescuer is available, have him hold the victim's head so that the jaw is jutting out.

The helper should be alert to detect the presence of any stomach contents in the mouth and keep the mouth as clean as possible at all times.

The Back Pressure—Arm-Lift (Holger-Nielsen) Method (Illustration, page 96)

If there is any foreign matter visible in the mouth, wipe it out quickly with your fingers or a cloth wrapped around your fingers.

1. Place the victim face-down, bend his elbows and place his hands one upon the other, turn his head slightly to one side and extend it as far as possible, making sure that the chin is jutting out.
2. Kneel at the head of the victim. Place your hands on the flat of the victim's back so that the palms lie just below an imaginary line running between the armpits.
3. Rock forward until the arms are approximately vertical and allow the weight of the upper part of your body to exert steady, even pressure downward upon the hands.
4. Immediately draw his arms upward and toward you, applying enough lift to feel resistance and tension at his shoulders. Then lower the arms to the ground. Repeat this cycle about 12 times per minute, checking the mouth frequently for obstruction.

If a second rescuer is available, have him hold the victim's head so that the jaw continues to jut out. The helper should be alert to detect any stomach contents in the mouth and keep the mouth as clean as possible at all times.

Artificial Respiration for Water Cases

Individuals who die as a result of a water accident usually die from the lack of air, and not because of water in the lungs or stomach.

A drowning victim may be either active or passive. Unless unconscious, the drowning victim usually struggles to remain on the surface or to regain the surface, in order to secure air. These efforts are energy-consuming and may result in the victim swallowing varying quantities of water. This water, along with food remaining in the stomach, could, if regurgitated, obstruct air passages and interfere with the efforts of the rescuer. The possibility of obstruction must be recognized by rescuer and immediate steps taken to relieve it if it occurs.

Evaporation of water from the victim's skin will result in lowering still further a body temperature that may already be dangerously low. It is imperative, therefore, to keep the victim from becoming chilled.

Related Information for All Methods

Time your efforts to coincide with victim's first attempts to breath himself.

If vomiting occurs, quickly turn the victim on his side, wipe out the mouth, and then reposition him.

Normally, recovery should be rapid, except in electric shock, drug poisoning, or carbon monoxide poisoning cases. In these instances, nerves and muscles controlling the breathing system are paralyzed or deeply depressed, or the carbon monoxide has displaced oxygen in the blood stream over a period of time. When these cases are encountered, artificial respiration must often be carried on for long periods.

When a victim is revived, he should be kept as quiet as possible until he is breathing regularly. He should be kept covered and otherwise treated for shock until suitable transportation is available, if he must be moved.

Artificial respiration should be continued until the victim begins to breathe for himself, or until a physician pronounces the victim dead, or until the person appears to be dead beyond any doubt.

A doctor's care is necessary during the recovery period, as respiratory and other disturbances may develop as an aftermath.

HOME NURSING

You may have a bedridden member of your family at the time of a civil defense emergency. Plans should be made now to carry a sick member to the family shelter. The easiest way to carry a patient is by the chair litter method. (See the following section on Rescue Operations, pages 88-91.)

There is no substitute, of course, for the American Red Cross home nursing course already referred to, and it will more than repay the time involved if some member of your family registers for this course. In the absence of such instruction, these few home nursing procedures can be of help.

First of all, make a complete inventory of the household linen supplies. Such an inventory will not only be of value in determining the adequacy of linens for sickroom requirements in addition to normal needs—and remember that if utilities are destroyed or interrupted there may be no practical means of laundering soiled linens—but it will help to earmark linens which may later be vitally needed as bandages or compresses where flying glass may have caused multiple wounds resulting in excessive bleeding. Remember, within a 15-mile radius at least, not a pane of glass will be unshattered.

Nearly every family has an illness or injury at some time in the home. During a civil defense emergency, doctors and nurses may be unavailable. Homemakers should remember that there is an art and a technique in giving good nursing care, and that they are caring for a *person*—not just a patient. The following paragraphs deal with some of the essentials in caring for a bed patient.

Changing Bed Linen (Illustration, p. 98)

Every homemaker should know how to change bed linen with a patient in bed. Clean sheets should be available. A blanket or robe should be used to cover the patient while the linens are being changed. Follow the pictures; they show you how to change the bed linens.

How to Move a Patient in Bed (Illustration, p. 98)

Bedridden people should be moved at least once a day to relax the patient, improve circulation, prevent continued pressure on any part of the body over too long a period, avoid strain on the joints, prevent deformities, and to adjust the position for comfort or for giving treatment.

When moving a patient in bed, the home nurse should remember two essentials:

1. Keep good posture, so that you do not injure yourself.
2. Guide the patient's movements rather than do all the lifting. Follow the pictures; they show how to move a bed patient.

When a patient has been confined to bed for any length of time, it is essential that alcohol back rubs be given. The alcohol back rub helps protect the skin, aids blood circulation, and prevents bed sores.

1. Place the bottle of alcohol into a basin of warm water.
2. Turn the patient on his side or flat on his stomach. Fold the top bedding and gown so that his back and buttocks *only* are uncovered. Place towel on bed lengthwise and tuck one edge close to patient's body.
3. Pour a little alcohol in the palms of your hands. Pressing with the palms, rub patient's back, shoulders, and

buttocks. Use long firm strokes. Red areas on the skin should be rubbed gently but firmly. Do this by going around in small circles with your fingers or palms. When your hands become dry, wet them with alcohol and continue. A good back rub takes about three minutes.

4. When you've finished, dry patient's back with the towel.
5. Sprinkle a little talcum powder on your hands and rub it gently on patient's back.
6. Replace gown, tighten bed sheets, turn patient toward you, fluff up the pillow, and straighten the top bedding.

Preparations For Bathing

Bedridden patients should be bathed to cleanse, refresh and relax them. A bath will also stimulate circulation, provide a mild form of exercise, and aid in elimination by cleansing the pores.

The homemaker will need the following equipment when giving a bedbath:

Large basin of warm water
Container of hot water
Waste-water pail if not near a bathroom
Towels—two bath, one face
Washcloth
Soap in dish
Lightweight or bath blanket
Rubbing alcohol (warmed)
Body powder
Hand lotion and deodorant if needed
Tray with toilet articles
Newspapers for protection of the furniture
Clean pajamas or gown

1. Take everything you will need to the bedside. Be sure the sickroom is free of drafts. Remove the blanket

from the bed; fold and place over a chair. Cover patient with bath blanket and pull the top sheet from under it to the foot of the bed. Remove sheet, fold and place on chair. Remove patient's pajamas or gown.

2. To keep the patient warm, uncover only one part of the body at a time. Wash, rinse, and dry the part well. Then cover it right away.
3. To keep the washcloth from dragging across the patient, especially across his face, make a mitten of the cloth on your hand. This will also keep water from dripping on the bedclothes or patient.
4. Keep the soap in the soapdish when you're not using it.
5. The water should be warm; change it when it gets cool.
6. Take note of condition of patient's skin. Look for rashes, sores, or areas of redness.

Method of Bathing

When bathing a bed patient, a towel should be placed under that portion of the body being washed. Cover patient with bath blanket.

1. Wash the patient's face, neck and ears first. Rinse and dry well.
2. Next wash shoulders, armpits, arms, and hands. Rinse and dry well.
3. Put towel across patient's chest. Fold bath blanket down to patient's stomach. Raise the towel and wash chest. Pay special attention to the skin—especially on the back, shoulders, heels, elbows, and under the breasts of women patients. After rinsing, dry thoroughly.
4. Leave towel across patient's chest. Wash the abdomen, get between any creases of skin. Be sure to wash the navel. Dry thoroughly and pull blanket up over patient's chest.
5. Fold bath blanket back from the far leg. Wash and

dry the leg and foot. Be sure to wash and dry between the toes. Do same for other leg.

6. Empty washbasin. Refill it with clean, warm water. Turn patient on his side and wash, rinse, and dry his back. Rub it with alcohol and dust it with powder.
7. Turn patient on his back. Ask patient to finish his bath by washing the area between his legs.

RESCUE

What to Do if Someone Is Trapped

Most rescue requires trained workers. Hastily removing wreckage or debris to free a trapped victim may cause him additional injury, and might also injure the would-be rescuer. It cannot be repeated too often that moving a victim may aggravate his injuries. The rule is: Don't move an injured or unconscious person unless he has been given first aid. Haste in moving an injured person may cost his life.

However, we are dealing here with situations which will be far in excess of the ordinary emergency. The danger of fire, electric shock or asphyxiation (suffocation), may make it necessary for you to act before trained rescue workers can arrive.

If Someone Is Missing

To find a missing member of the family, begin at the bottom and work upward. If your first search is not successful, direct your attention to any sizeable accumulations of piled-up rubble or debris which are the result of blast damage. Look for signs of a protruding limb and if nothing is visible, listen for vocal sounds or the noise of labored breathing.

Here, if ever, you will be desperately in need of trained help. But if, as may well be the case, you are entirely on your own, once you have located the missing person, you must proceed with extreme caution. First carefully remove the smaller pieces of debris—lath and plaster, bricks, mortar, and similar structural units under which the victim is buried. These materials, while not too difficult to remove, have a heavy dust potential, and excessive dust concentration in the proximity of an unconscious person can mean suffocation. As you uncover larger members, such as studs, joists, or heavier beams, be particularly cautious. Make certain that the timber you are attempting to remove is not supporting a heavier mass which might be dislodged and crush the victim. Eventually, you may reach a point where the entire remaining mass can be lifted by leverage and the victim freed. A bar or even an automobile jack can be of great usefulness here, but be sure that your lifting will not cause dislodgment of the remaining debris. If you have no bar or jack available, your home contains many things that could be used as levers—bed slats, spare lengths of pipe, a pick or shovel, or even an ironing board (illustration, p. 95). Loads should be propped as they are lifted to keep them from falling back. This will likewise take the weight off the lever and allow its placement in a new position to raise the load higher. Finally, make sure that the fulcrum on which you pivot your lever is solid and will not crumble or tilt, thus endangering the rescuer as well as the victim.

If the victim is unconscious when found, he should be carefully turned on his back and his wrists tied together with a handkerchief or other article of clothing. The rescuer, by kneeling astride the victim and putting his head under the tied wrists, can then crawl forward, dragging the victim beneath him in the method known as the "fireman's drag" (illustration, p. 99).

Where there is no other alternative but to move an unconscious victim downstairs, and there is no help available to the rescuer, the correct procedure is to place him on his back with his head toward the stairs. The rescuer should put both hands under the victim's armpits, allowing his head to be cradled in the crook of one elbow, and then back down the stairs slowly, letting the victim's feet trail. This is known as the "incline drag."

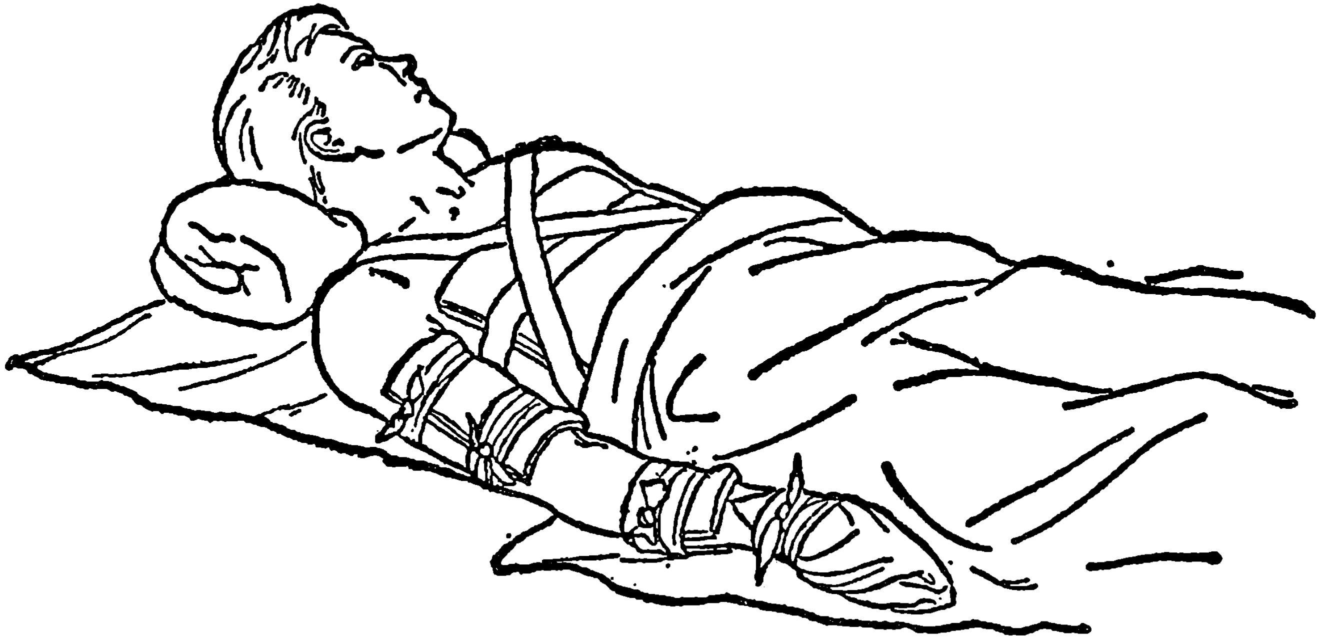
If there is help available, there are several other ways in which the victim can be moved. In an emergency, which of course this is, a chair may be used as a stretcher. Raise the victim carefully to a sitting position, and supporting him under the knees and upper back, lift him gently into the chair. One rescuer can then carry the chair by its front legs and the other by its back rest. This is the "chair litter carry" (illustration, p. 99).

Or, two rescuers can make a four-handed seat on which to carry a victim who has not lost consciousness. Each rescuer steadies the victim with an arm around his back. Then each rescuer slips his other arm under the victim's thighs and clasps the other's wrist in the manner sometimes referred to as the "lion's grip." One pair of joined arms makes a seat rest, the other pair a back rest. Both rescuers then rise slowly in unison, lifting the victim from the floor or ground (illustration, p. 100).

Remember, these measures are extreme, and are to be used only if there is greater danger to the victim from fire, fumes, or fallout than there is from moving him. The fixed rule on moving injured persons, unless you are a thoroughly trained rescue worker, is still—don't. Refer again to the section on "Moving Injured Persons," page 77.

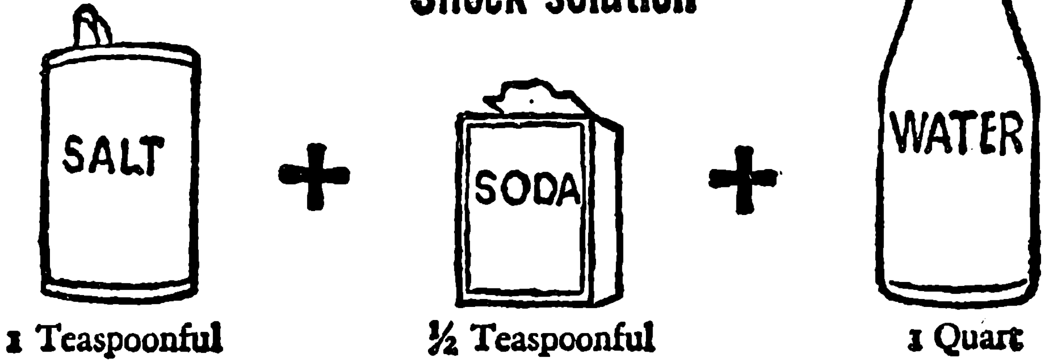
Remember, too, that under the foregoing conditions, there may be danger from live wires. If the victim is in contact with a live wire, the rescuer must not touch him without first protecting himself. Shut off the current if you can. Failing this, stand on dry wood or paper and cover your hands with heavy dry gloves or cloth before touching the victim. Better still, poke or pull the wire away from the victim with a dry stick such as a broom handle or rake handle.

This is one of the reasons why are advised, as soon as the alert sounds, to turn off all utilities—electricity, gas, and water. Leaking gas, oil fuel, or water are all dangerous to unconscious persons, especially in basements. If your local utility companies or civil defense headquarters have not already issued instructions for controlling these utilities, check with the utility companies and learn your local policy. And if you don't already know, learn immediately where to turn off the main gas and water valves and the electric service to your home, and instruct the other members in the family of their location and operation.

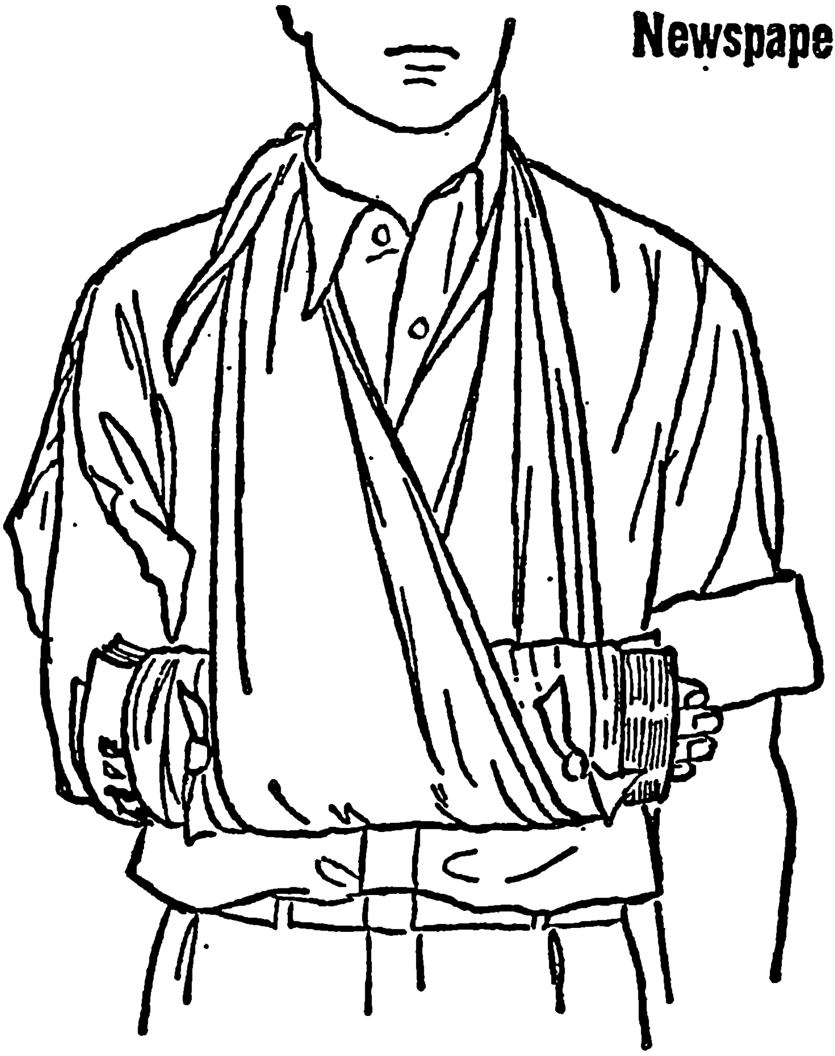


Dry dressing for burns

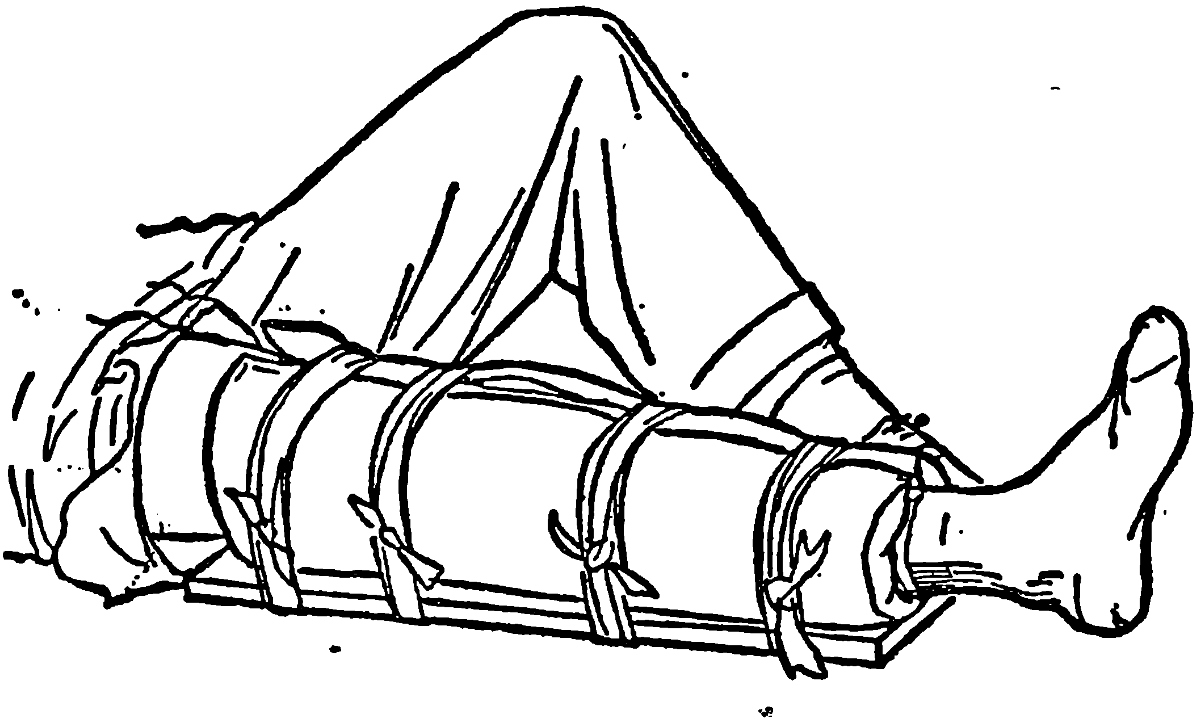
Shock solution

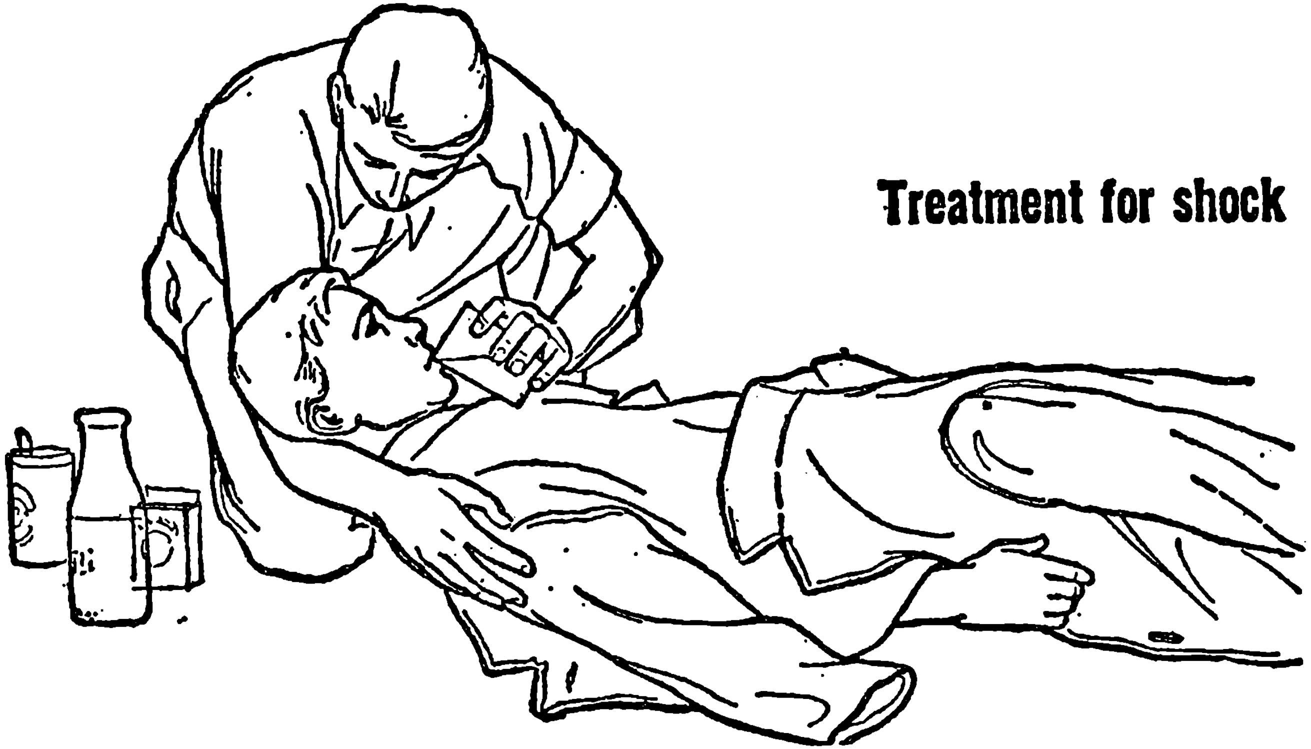

SALT
1 Teaspoonful
+
SODA
½ Teaspoonful
+
WATER
1 Quart

Newspaper splint and sling



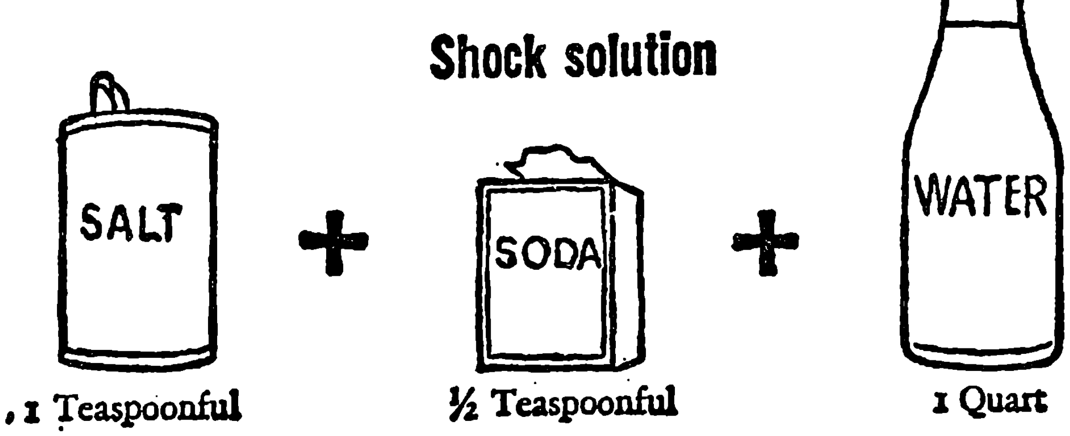
Emergency splint with pillow padding

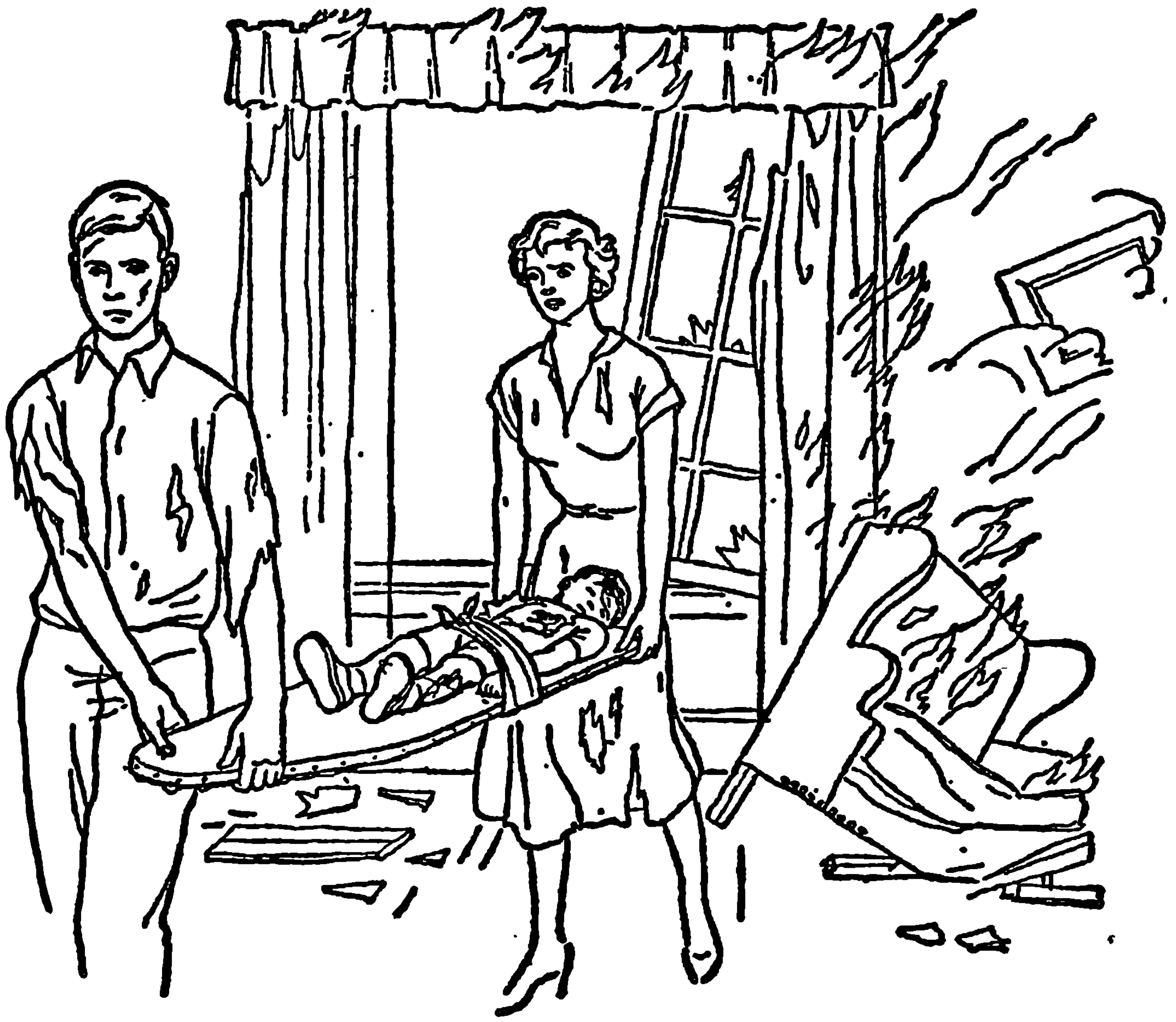




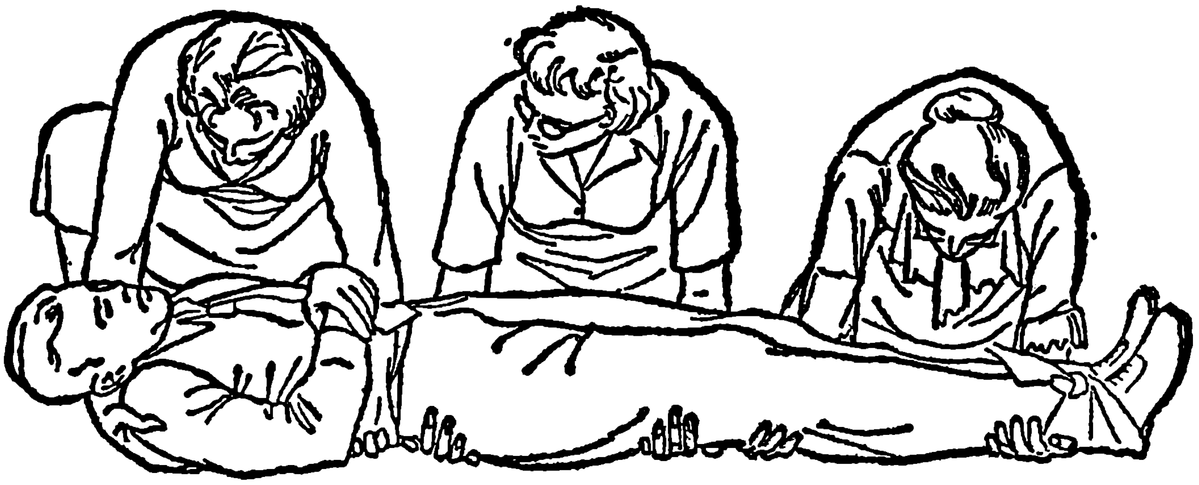
Treatment for shock

Shock solution

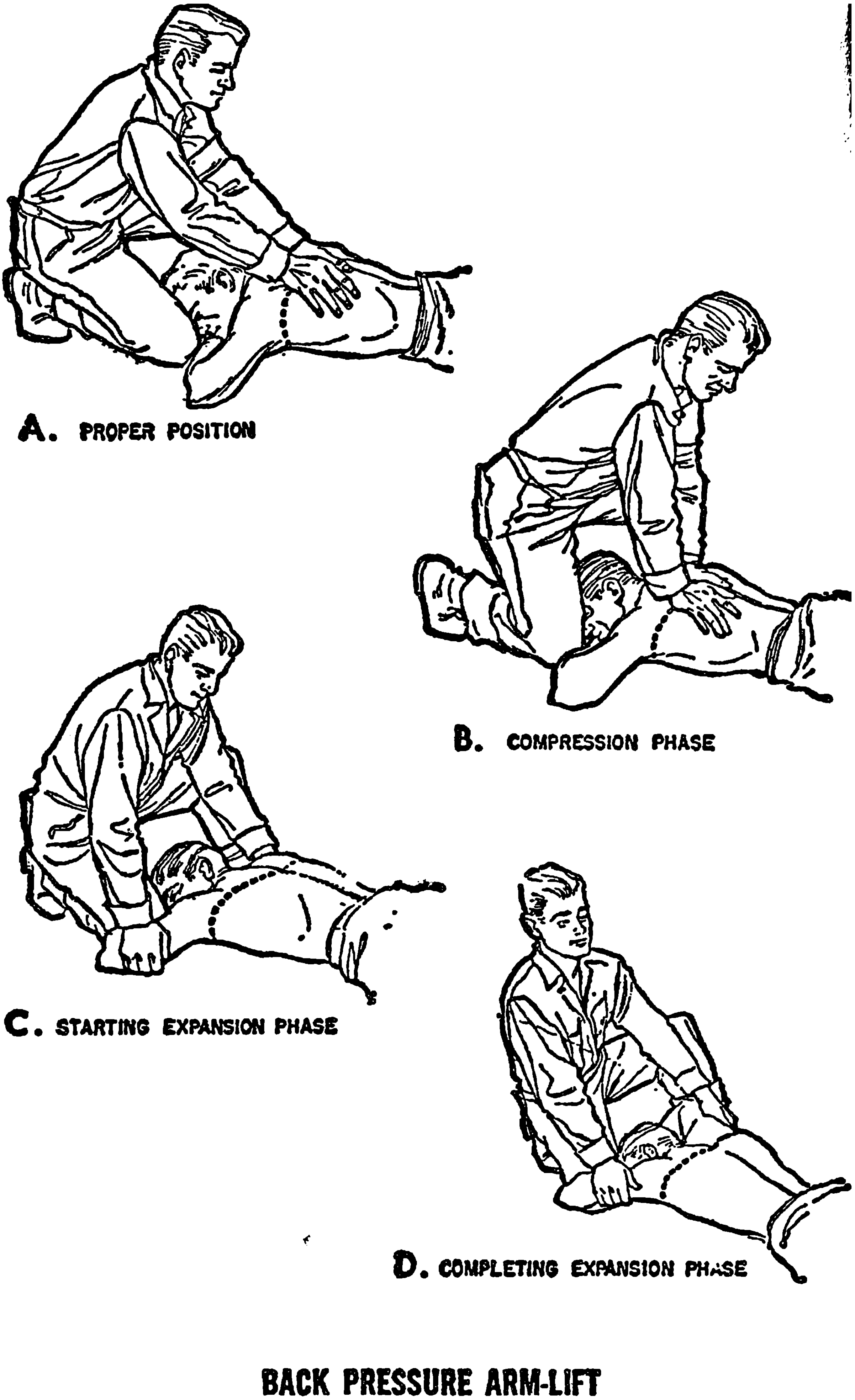

SALT
1 Teaspoonful
+
SODA
½ Teaspoonful
+
WATER
1 Quart



Ironing board for emergency stretcher



Moving without a litter



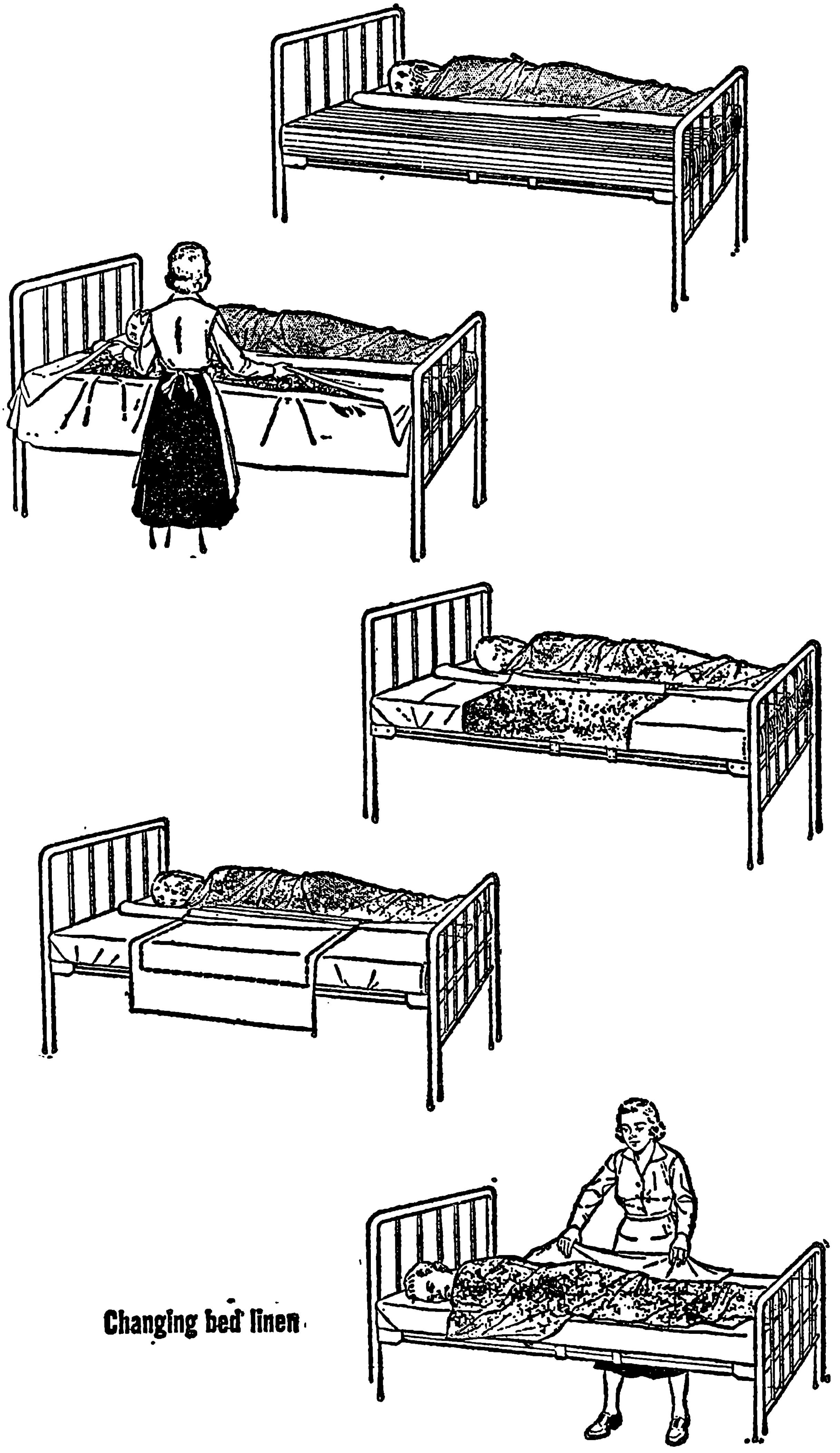
A. PROPER POSITION

B. COMPRESSION PHASE

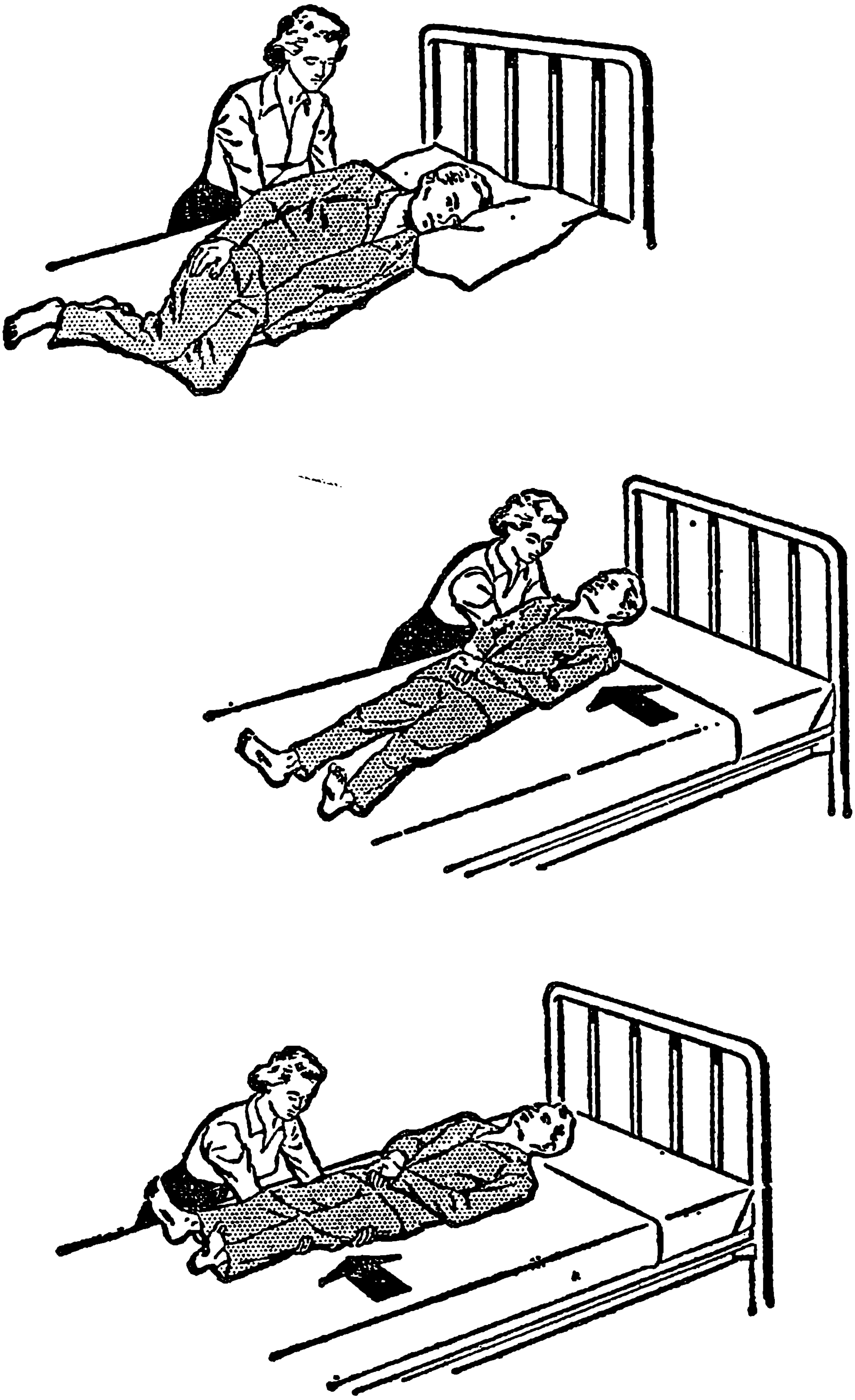
C. STARTING EXPANSION PHASE

D. COMPLETING EXPANSION PHASE

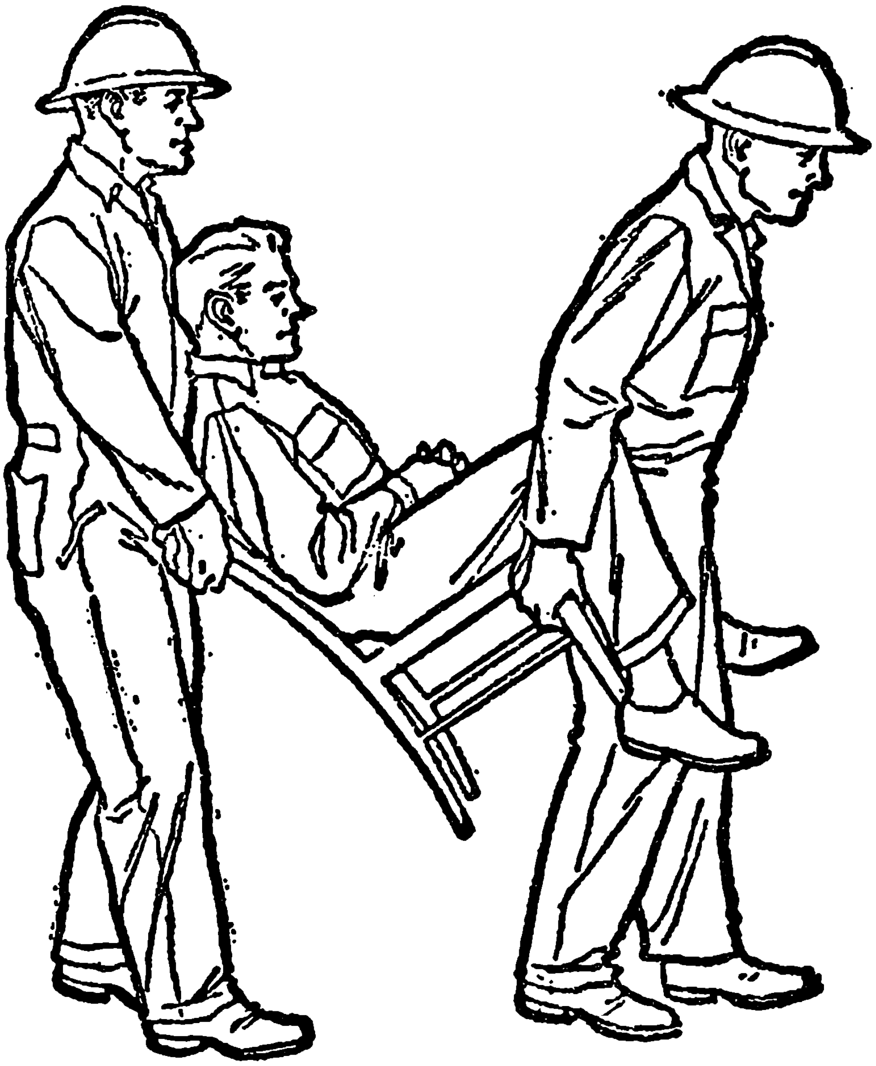
BACK PRESSURE ARM-LIFT
(HOLGER-NIELSON) METHOD OF ARTIFICIAL RESPIRATION



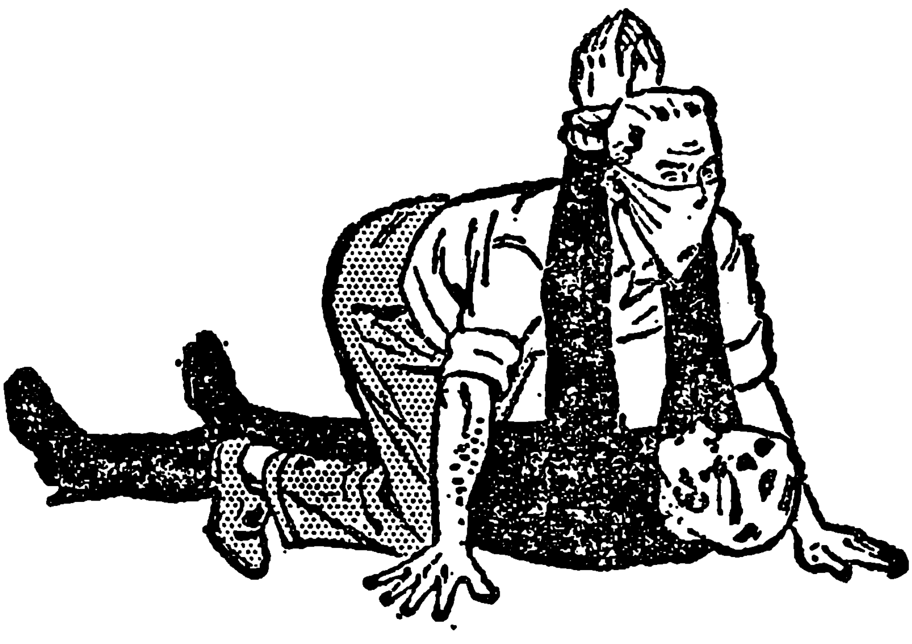
Changing bed linen



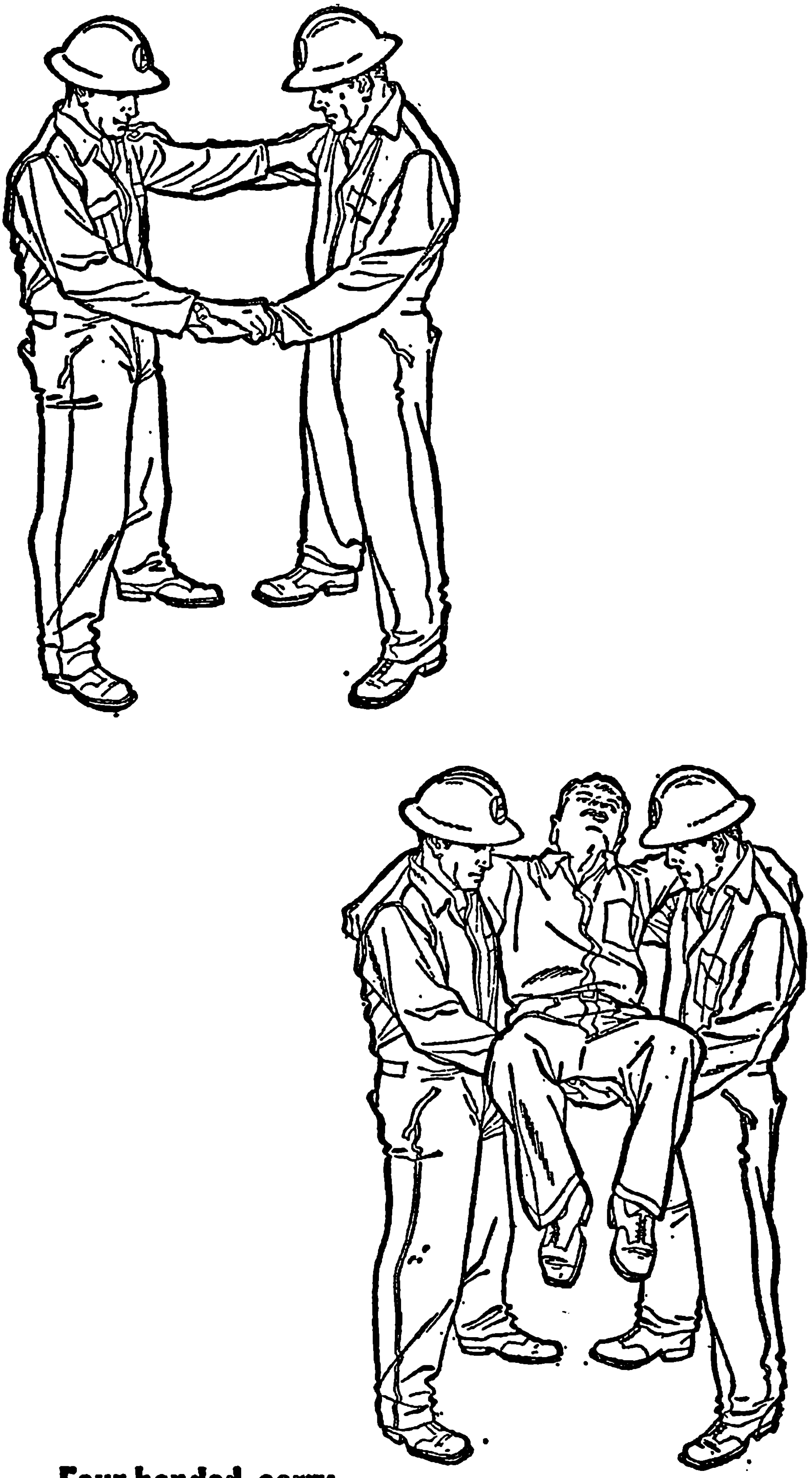
How to move a patient in bed



Chair litter carry



Fireman's drag



Four-handed carry

CHAPTER 6

EMERGENCY SANITATION IN THE HOME

In order to stay healthy after an enemy attack it will be necessary for you to make certain definite preparations now, before anything has happened. You will require, immediately after the disaster, three things so elemental that the lack of them could defeat survival and yet so simple that anyone who failed to provide them for his family could well be accused of criminal negligence. The period during which you may need these may be only a few days until help is able to reach you or it may be as long as two weeks until danger of contamination has passed. But whatever the interval, you must have:

1. Safe drinking water
2. Safe food
3. Emergency sewage disposal

You know that impure water and unsafe food can make you sick, or even kill you. You know that garbage and human wastes can help spread disease if not disposed of promptly. You know it is important for health reasons to keep clean, and to keep your home clean. Yet you probably take for granted the public services that now guard your family against infections of all kinds.

Many of these public services would be temporarily knocked out by enemy attack. If your local water utility were damaged, your household water supply would be cut off until repairs could be made. If sewer mains were broken it would not be possible to dispose of human wastes by the usual methods until they were fixed. Lack of garbage collection and garbage disposal service would encourage the increase of rats, flies, and other disease-carrying agents. It would be hard for the people who supply you with food and fresh milk to resume their usual services for some time after disaster struck. You would be on your own until these facilities could be restored.

There are a few simple steps you can take *now* to assure your family safe water and safe food, free from harmful contamination. Also, you can be ready to handle the disposal of garbage and other wastes if you take a few prior precautions.

Every family should be prepared to manage its own food, water, and sanitation problems for at least three days following a disaster. By that time, civil defense health and welfare measures would be in operation. Don't wait for an enemy attack before acting on this problem. Home preparedness would be equally useful in natural disasters such as earthquakes, hurricanes, and floods.

YOU MUST HAVE SAFE DRINKING WATER

You and your family could get along for quite a while without food, if necessary, but you must have safe water to drink.

Interruption of this vital service, as a result of enemy attack, is not the only thing that could happen to your home water supply. Leaking sewage, poisonous chemicals, radioactive materials or even disease-carrying organisms from biological warfare attacks might get into the pipes and make your drinking water unsafe. You might be told by your local warden to turn off the water service valve to prevent such contamination from entering your home. If household pipes were broken you would want to shut off the water yourself, to avoid flooding your shelter. Or, civil defense authorities might ask you to shut off the water supply to your home to maintain fire-fighting pressures in some other part of the city.

To insure a safe supply for emergency use, store enough drinking water for your family right now. You should have available at least one gallon of water or other fluids for each member of your family. If you have children under three years of age, provide an extra gallon for each child to be sure of a three-day supply.

This may sound like a lot of fluid to store, but the chances are that you usually have on hand several quarts of various liquids that can be used for drinking purposes. Milk serves as a substitute for water when your family is thirsty. So do all other bottled beverages such as soft drinks, fruit drinks, and liquids from water-packed fruits and vegetables. There are many emergency sources of drinking water in your home that you can use if you must, as you will read later on in these pages. To be on the safe side, however, you should store some water for drinking purposes only.

Glass jugs with tight-fitting covers or stoppers make good storage containers, provided they have been washed clean with soap and water and rinsed thoroughly. Fruit jars, quart bottles, or other types of glass containers will do just as well. Metal containers are all right but some tend to give water an unpleasant taste. It is not necessary to boil drinking water before sealing it for storage. Water fresh from the tap is safe provided the containers are clean.

Store Drinking Water Carefully

It is a good idea to pack your containers tightly against damage from blast or shock, especially if you are using glass bottles, jugs, or jars. You can do this by wadding newspapers, excelsior, or other packing material between the jars to keep them from coming in contact with one another. Pack them as though for a long move. Then your containers will be less likely to break if there is an explosion near your home.

Water may not keep very well over a long period of time, due to the growth of algae. Store drinking water in a dark place to help slow down the growth of these little plants.

Empty the containers, rinse them and refill them with fresh water at least every three months, preferably oftener. This will keep your storage supply fresh and ready for use.

Don't Wait to Store Water Supplies

Water to be stored should be drawn into containers *before* it is needed, and not at the last minute, or during an attack. Don't wait until an emergency happens before laying in your household supply. When an attack occurs, it may be too late to act. The public water service may already be interrupted or contaminated. Also, if thousands of householders tried to fill water containers at the same time, they would reduce the pressure in the street mains. That would make fire fighting more difficult. Waiting until something happens before you draw and store the water you need could cost you your home, or even your life.

How to Shut Off the Water Service Valve in Your Home

The water service valve usually is located in the basement or just outside the house, often near an outside faucet. Or, it may be found in a curb box. You should know where to find the shut-off valve that controls the water service to your home, and all members of your family should be acquainted with its location as well. Try the valve to make sure that it works freely. If a tool, such as a wrench, is needed to operate the valve, be sure you know where to lay your hands on it quickly in an emergency. And be sure you know how to use it.

How to Purify Your Drinking Water (illustration, p. 125)

If you do not have enough stored water on hand in your home following an attack, you will need to know where to get more from outside. Also you will want to know how to treat such water to make it safe. Do not use water direct from a tap immediately after an attack. If the system is still working, or as service is restored, you will be notified when it will be safe to use water drawn from the tap. Follow the instructions of the civil defense authorities. In other cases, emergency water rations may be delivered to distribution points in your neighborhood. Or, you may be instructed to use water drawn from taps or wells after you have taken certain steps to purify it. Good methods of purifying water include the following:

1. *Boiling*: Most water can be purified for drinking purposes by boiling it for five or ten minutes. This will destroy the germs. The flat taste caused by boiling the water is easily removed. Simply add a pinch of salt. Or, if you prefer, pour the boiled water from one container to another until it picks up enough air to restore its normal taste.
2. *Chlorination*: It may not be possible to boil your drinking water due to the failure of gas or electric power, or damage to your stove. Open flames are a good thing to avoid in the first few hours following an enemy attack, due to the danger of fire from gas or fuel oil leaks in your home or neighborhood. Under these conditions it would be better to chlorinate your drinking water instead of boiling it.

   Any household bleach solution that contains hypochlorite may be used for this purpose. The strengths of such solutions are given on the labels. You can mix them with water in a milk bottle, thermos jug, or any other container that has a stopper. Be sure you know how much the container holds, so that you get the right mixture. The proper amounts to be used, according to the strength of the solution, are shown in the following table:

Dosage[1] of Chlorine Solution for Disinfecting Drinking Water

Gallons of water	Dosage of 5.25% solution for—	
	Clear water	Cloudy water
1/4 (one quart)	1 drop	3 drops.
1	4 drops	10 drops.
5	1/4 teaspoon	1/2 teaspoon.

[1] For different chlorine strengths and for other volumes of water, the dosage should be adjusted proportionally.

After adding the proper dosage and stirring, allow the water to stand for 30 minutes. After that length of time it should have a distinct taste or smell of chlorine. If this taste or smell is not present, add another dose to the solution and let the water stand for another 15 minutes. The taste or smell of cholorine in water thus treated is a sign of safety. While unpleasant, it is not harmful. On the contrary, if you cannot detect chlorine in water that you are trying to purify by this method, do not drink it. The solution may have become weak through age or for other reasons.

3. *Purification tablets:* Such tablets release chlorine, iodine, or bromine when dissolved in water. They may be used safely to purify drinking water when only a small quantity is needed at one time. Use the tablets in accordance with the directions on the container. Double the dosage when the water is cloudy. Let the water stand for 15 to 30 minutes after dissolving the tablets. Purification tablets are sold under various trade names at drug stores and are included in the recommended home first-aid kit in Appendix C, page 290.
4. *Iodine*: Ordinary household iodine may be used to purify small quantities of water if chlorine compounds

are not available. Add two or three drops of tincture of iodine to each quart of clear water (eight to ten drops for cloudy water). Mix and allow to stand for 30 minutes.

5. Other methods of purification may be recommended by the proper authorities if special conditions arise. In such cases follow the instructions of your civil defense officials.

Special Tips About Water Usage

If you are asked to shut off the service valve that controls the water supply to your home, or if the taps do not flow following an attack, turn off all the water outlets. These include taps or faucets, valves on pipes supplying float-controlled equipment such a flush toilets, air-cooling equipment, and heating equipment. Then, when the water comes on again your home will not suffer flooding.

Turn off the gas or electricity that supplies your hot-water heater after closing your home water service valve, or when your water supply is interrupted for any other reason. Otherwise, if the limited supply of water remaining in your hot-water storage tank continues to be heated, an explosion may occur. Also, if no more water can reach the tank, continued heat will soon muddy the contents and make the water useless for washing or drinking purposes.

If your water service is cut off following enemy attack, notify your block warden. Do not try to telephone or otherwise communicate with your local water department or water company. The officials in charge will be doing all they can to restore your service. Complaints will only add to their burdens. Besides, you will be using telephone lines that are needed for other civil defense emergencies.

Once service is restored, the water from your faucets may have a strong chlorine taste. Do not worry about this. It is a sign that extra precautions are being taken for your safety. If there is any doubt about leaks in the water mains or other possible sources of contamination, more chlorine than usual will be added to the water supply by health officials to make sure that it is safe.

Do not drink or use for cooking purposes any water other than that obtained from your faucet, or other recommended emergency source in the home, or from special water dispensing stations operated by proper authorities. It is dangerous to use water that has not been properly purified or approved. This applies to all sources that have not been inspected, such as wells, cisterns, streams, or ponds. If the public water supply service cannot be restored within a reasonable time following disaster, emergency water rations will be made available to you. Meanwhile, play it safe.

Be alert for instructions regarding water usage from your civil defense or public health officials, or from the water department itself. These are the proper authorities to advise you about the safety of your water supplies. Their instructions will be relayed to you by wardens, messengers, radio, mobile loud speakers, handbills, or newspaper stories. Don't listen to any rumors from other sources about the safety of your water supply, or pass on such rumors to others. Pay attention to official instructions only.

Emergency Sources of Liquids (illustrations, p. 124)

Water-packed fruits and vegetables are a good source of liquids for drinking purposes in an emergency, provided the containers are undamaged. Fresh fruits that have been under cover, especially citrus fruits, are also good sources of liquids. If they have been exposed to radioactive dust or mist, however, oranges should be wiped clean before being squeezed. Other fruits such as apples or peaches should be peeled before being eaten.

Another source of good drinking water would be your refrigerator. Unless the refrigerator itself were damaged by blast, it would protect the contents against radioactive dust or mist. Even if the electricity or gas by which it operates were shut off, you could drink the water from the melted ice cubes in the trays.

YOU MUST HAVE SAFE FOOD

After an attack the contents of cans, jars, cartons, and other food packages that have not been broken or punctured by an A-bomb blast would be perfectly safe to eat. Most radiation that is destructive to living tissue is not damaging to most other materials, including packaged food.

Wash or Wipe Clean All Food Containers

However, it would be well to wipe or wash carefully any can, bottle, or other containers—or any covered dish—that had been exposed to radioactive mist or dust. Tiny particles of "bomb ash" often are to be found in such mists and dusts. These particles are still radioactive and can make you sick if enough of them get inside your body. Radioactive dust on cooking or eating utensils is another problem. Such dust cannot be made harmless by boiling or by the use of soap and water. The particles can be washed or wiped away, but that does not render them harmless. They are still "hot" and will remain on the cleaning cloth or washing water.

That is why you should use separate tubs or pails for washing yourself, your clothes, and your cooking utensils after a nuclear blast. Empty and rinse such tubs or pails outside the house. Avoid any kind of handling that might allow such particles to reach the mouth.

After an attack, you should not drink water that has been exposed to the open air until your civil defense officials annouce that it is safe. Water from closed containers will be all right. Water stored in open tubs or buckets may not be. The same thing applies to food that may have been left out in the open. Food that has been stored in closed cupboards or in your refrigerator should be safe to eat after an attack. Food that has had no protection may not be.

What To Do About Food Needs (illustrations, pp. 126-128)

You should not hoard large quantities of food under any circumstances. That would be wasteful and foolish. You should keep on hand at all times a normal three-days' supply, but the chances are that you already have that much on hand. Look and see. If not, buy now the additional food you might need.

Your food supply should consist of foods that normally fit the food habits of your family. For example, children, the ill, and the aged, need milk and other foods that are easily digested. Larger supplies of canned fruits and vegetables should be substituted for fresh foods that will spoil quickly in the event of refrigerator failure. Powdered, condensed, or evaporated milk may be substituted for fresh milk, and so on.

You should include some foods which do not need refrigeration and which can be eaten without cooking if necessary. The reason for this is that your gas or electricity might be cut off as the result of enemy attack. If your refrigerator were not working, it would be hard for you to keep perishable foods in good condition through an emergency period. And, if your stove were out of order, it would be hard to prepare hot meals.

Some packaged foods become rancid and lose flavor when stored for long periods. That is why you should use and replace foods from your reserve stock rather than keep them separate from your daily supplies. Check packaged food regularly to make sure that they are not being attacked by rodents or insects.

When buying cans or packages of food for your reserve supply, get them in sizes which will meet your family needs for one meal only. In an emergency this would cut down on leftovers, which would be hard to preserve for later use if your refrigerator were not working.

Choose emergency foods that provide a well-balanced diet. These might include canned fruits, fruit juices, vegetables, soups, milk, fish, meat, and baby foods, as well as packaged cereals and dried food. Raisins and chocolate are good energy-building emergency foods, and take very little storage room. It is a good idea to avoid salty foods, because they would add to the problem of finding enough drinking water.

If your baby's formula depends upon a powdered mixture, keep an extra supply in the house. It would be a good idea to plan on using canned milk. Keep at least a three-day supply of small cans on hand for that purpose. A single can will remain fresh and sweet for several hours after it has been opened, even without refrigeration. For mixing with milk, and for the baby to drink, use only water that you know is safe.

For diabetics or other members of the family who may require special diets, lay in extra supplies of canned food right now to meet their particular needs in case of emergency.

After an attack every effort will be made by local civil defense authorities and the food industry to make available a supply of food at your regular grocery store. It is possible, however, that an immediate emergency rationing program will have to be placed in effect to conserve food until additional supplies can be brought in from outside the stricken area. This is the reason why the maintenance of a minimum three-day supply of food on your pantry shelf is vital.

How to Eat Safely

All cooking and eating utensils, including tableware, should be thoroughly scrubbed with soap and water if there is any possibility that they have been exposed to radiological, chemical, or biological contamination. Packaged dishwashing powders are all right for washing such utensils. So are strong soaps. If your water supply has been cut off, wash only the utensils you need to use.

Paper cups and plates are handy things to have if the water supply is cut off, because they need not be washed and can be burned with the rubbish. Paper towels and napkins are good, too, when laundry needs cannot be met. If you have room, store a good supply of such things for emergency use. The wrappers they come in will protect them from radioactive dust and mist unless the packages are broken.

Refrigerators and home freezer units should be kept closed as much as possible once the services they depend on are cut off. The foods they contain will keep longer if you don't open the doors any oftener than necessary. If the gas or electric service is not restored within 12 hours, eat or cook the most perishable items in your refrigerator before they spoil. If you have no way of cooking them, throw them out before they contaminate other foods that keep better.

Home freezer units will keep frozen food for about 36 hours after they are shut off. Frozen meats and other frozen foods can be preserved for later use only by cooking them as soon as they begin to thaw. Frozen foods spoil very quickly after thawing. Once thawed, they should not be refrozen until they have been cooked first.

Milk needs special attention when an emergency occurs because it is easily contaminated. If you are not sure your supply of fluid (bottled) milk has been pasteurized, you should heat-treat it at home before using. You need not worry about canned milk because it has been heat-treated in processing. Heat-treating gives bottled milk a cooked flavor, but it is a wise precaution to take when public sanitation services fail. Here are two simple methods for heat-treating fluid milk at home:

(a) Pour water into the outer unit of a double boiler and bring it to a vigorous boil. Pour the milk into the inner unit and settle it in place, letting the boiling water in the outer unit heat the milk. Cover and maintain at a boil for ten minutes.

(b) Bring the milk quickly to a boil in an open saucepan while stirring constantly. If a good cooking thermometer is available, heat the milk to 165 degrees Fahrenheit instead of to a boil. Then place the saucepan in cold water and stir the milk until it has cooled.

Produce from your home vegetable gardens may be contaminated during an enemy attack. Do not eat such produce, or even collect it until the neighborhood has been officially declared free of contamination.

Official instructions regarding food will be used locally by civil defense authorities in the event of an emergency. These instructions will tell you the type of attack and its effect upon milk and other foods. It is well to remember that biological and chemical warfare might be used to affect your food supply. Follow official instructions closely. These will reach you through your warden, by radio, and by other means.

Rumors about the safety of milk or food supplies often spring up in wartime. Such rumors are often started by enemy propaganda agents. Be ready to do your part to stop them. Don't listen to such rumors, and don't pass them on to others. Pay attention to official instructions only.

Maintaining Cleanliness in Emergency Cooking

If public utilities are out, it may be necessary to improvise equipment for heating water or for cooking and serving meals. This will insure supplies of hot water for washing and permit heating of foods to proper temperatures for making them safe.

There are many ways of improvising heating equipment depending on one's ingenuity and the time and material available.

Canned-heat burners usually may be used safely anywhere indoors. Of course no open flame will be safe when gas, fuel oil, or explosives are nearby. Remember that fire is even more dangerous where water supply is cut off. To use canned heat properly, first remove the paper label from around the can. Pry off the cover and touch a lighted match to the can's contents. Never blow out the flame. To extinguish it, slide the cover on upside down. Wait for the can to cool before pressing the cover down. Prevent canned heat from evaporating by keeping the cover on tight when not in use.

Out-of-Doors Cooking (illustration, p. 129)

Out-of-doors cooking can be done over several types of fires such as the trench fire, the hunter or trapper blaze, or an improvised fireplace. Each of these can be easily controlled and offer adequate space for pots and pans.

A trench fire is nothing more than a fire built in a trench dug in the ground and facing the wind. This assures proper draft unless too strong a breeze is blowing, in which case an open fire should not be built.

Support for the pots and pans can be made from such debris as a piece of flat scrap sheet iron or a sliding grate from a kitchen stove. Many more materials can be used as supports for pots and pans in which to cook or heat water over a trench fire.

The hunter or trapper blaze is a fire laid between two parallel green logs, flat rocks, rows of brick, or pieces of beams that may have been dislodged by the explosion. Again, the beams, rocks, etc., should be placed facing the wind. By varying the angle of the beams, rocks, or brick it is possible to accommodate varying sizes of pots and pans.

Another type of fire can be laid in an improvised fireplace made of bricks or rocks. The fireplace may be nothing more than a slanting hole dug into the side of a hill or in your backyard. The fireplace must have a chimney for proper draft.

Remember, a large fire is unnecessary. Fires made from such hardwoods as oak, hickory, maple, ash, or beech last longer and produce the best coal bed. The coal bed makes the difference between easy and difficult cooking. The harder the wood the steadier and more even the heat.

If a Dutch oven (a cast iron pot with a lid) is available, it can be placed directly on the coals. The coals should be heaped high around the oven.

In addition to these other methods of improvised cooking, it is possible to use an inexpensive charcoal grill that burns briquets or wood.

Actually, one need not be an expert to know how to cook out-of-doors. A little practice, patience, and some ingenuity will produce results. When selecting an outdoor cooking site, remove all flammable materials surrounding the site, and do not select a cooking site that is near broken gas pipes.

EMERGENCY SEWAGE DISPOSAL

Water flush toilets cannot be used, of course, when water service is interrupted. The water remaining in the fixture is not sufficient to flush the wastes down the sewer. Clogging may result, and your living conditions then become just that much more uncomfortable.

Even if water is available, civil defense authorities may ask you not to use flush toilets, or use wash basins and other fixtures connected with soil pipes. The sewer mains may be broken or clogged, which would make it impossible to carry off such wastes. Or water may be needed for fire fighting. It is necessary for every family to know emergency methods of waste disposal, in case such conditions arise.

A Few Simple Precautions (illustration, p. 130)

Failure to properly dispose of human wastes can lead to epidemics of such diseases as typhoid, dysentery, and diarrhea. At the same time, sewage must be disposed of in ways that will prevent contamination of water supplies used for drinking, cooking, bathing, laundering, and other domestic purposes. Here are simple steps that any family can take to prevent such dangers and discomforts:

(a) Right after an enemy attack, or during one, you will probably not have the time and tools to prepare a complex emergency sanitation system. If the attack is continued for some time, or if there is a delay of several days in restoring sewerage service to your neighborhood, you may find that disposal is a big problem. Your first task, however, is to make some temporary toilet provision for members of your family, especially the children. Almost any covered metal container will do. You can use a covered pail. A small kitchen garbage container with a foot-operated cover can be put to bathroom use in emergencies. Anything that has a cover and will hold the contents until you can dispose of them will serve for sanitary purposes, at first.

(b) Keep on the premises an extra ten-gallon garbage can or other waterproof container with a tightly fitted cover. This should be lined with paper, and the cover should be fastened to the can to prevent its loss. Such a can may be used for the emergency storage of body wastes until the public sewerage system can be put back into action, or until other arrangements can be made. Empty your smaller vessel into it as often as necessary. A small amount of household disinfectant should be added after each use. If you live in an apartment with an incinerator, you may not have a large garbage can or room to keep one. In that case two smaller covered pails or other containers will do just as well.

(c) Keep a shovel on the premises if there are unpaved yard areas nearby. Burying human waste matter under 12 to 24 inches of earth is a satisfactory method of emergency disposal. Never deposit wastes, liquid or solid, on the surface of the ground. Insects and rodents may carry infections to other humans.

(d) Where possible, temporary pit toilets with removable cover over the seat to make them flyproof may be constructed in a yard area for use by several families. These offer a good method of waste disposal over extended periods of time. The structure need not be elaborate, so long as it provides reasonable privacy and shelter. Accumulated waste should be covered with not less than twelve inches of earth when the toilet is moved or abandoned.

Outdoor toilets should not be located in areas that are subject to flooding, and should be built at least 50 feet from any well, spring, or other source of water supply. Otherwise the wastes may contaminate the water. Or, they might be washed out of the pit and deposited on the ground surface where they would be exposed to flies, rodents, and other animals that might serve as disease carriers.

(e) Persons in city apartments, office buildings or homes without yards should keep a supply of waterproof paper containers on hand for emergency waste disposal. Where flush toilets cannot be used and open ground is not available for the construction of privies, such disposable containers offer a practical method of emergency waste collection and disposal. Building managers should plan for the collection of such containers and for their final disposal. Before collection, the used containers may be stored in tightly covered garbage cans or other waterproof utensils fitted with lids. Homemade soil bags for this purpose may be prepared very easily by putting one large grocery bag inside another, with a layer of shredded newspaper or other absorbent material between. Apartment dwellers should have sufficient grocery bags on hand for possible emergencies. A supply of old newspapers will come in handy for other sanitary uses, too, such as wrapping garbage and lining larger containers.

(f) Insecticides and deodorants should be used when necessary to control odors and insect breeding in containers that cannot be emptied immediately. Fly-breeding in toilet pits may be reduced by adding quicklime or chloride of lime, and by spraying with any insecticide containing DDT. Several handfuls of chloride of lime or quicklime, sprinkled directly on the pit contents once or twice a day also will help reduce odors. If lime is not available, wood ashes may be used instead for odor control. At least two pints of household chlorine solution should be kept on hand for other disinfecting purposes.

(g) Keep on hand an extra roll or two of toilet tissue, plus a supply of sanitary napkins. If there is illness in the house that requires rubber sheeting or other special sanitary equipment, make sure that adequate supplies are available. At least a week's accumulation of daily newspapers will come in handy for insulating bedding from floors, lining clothes against cold, as well as for the sanitary uses already mentioned.

(h) If you have a baby in your home you may find diaper laundering a problem under postattack conditions. It is best to keep an ample supply of disposable diapers on hand for emergency use. If these are not available, emergency diaper needs can be met by lining rubber pants with cleansing tissue, toilet paper, scraps of cloth, or other absorbent materials. Or, any moisture-resistant material can be cut and folded to diaper size and lined with such absorbent material.

Disposal of Garbage and Rubbish (illustration, p. 131)

Garbage may sour or decompose; rubbish, will not, but offers disposal problems in an emergency. Garbage, or any mixed refuse containing garbage, must be carefully stored and handled if odor and insect nuisances are to be prevented. Since rubbish alone is fairly easy to dispose of, garbage should be kept separate from it and not mixed. The following suggestions will make it easier for you to take care of the refuse problem:

(a) Garbage should be drained before being placed in storage containers. If liquids are strained away, garbage may be stored for a longer period of time without developing an unpleasant odor. After straining, wrap the garbage in several thicknesses of old newspapers before putting it into your container. That will absorb such moisture as may remain. A tight-fitting lid is important to keep out flies and other insects.

(b) You should keep a 20-gallon can on hand for emergency use, if possible. A garbage can of that size will serve most families for at least a week, which should be long enough to allow civil defense officials to restore collection service or make other disposal arrangements. Be sure the lid is wired or tied to the body of the can to keep it from being lost or stolen. If you live in an apartment building, get the largest kitchen garbage container you have space for.

(c) All stored garbage should be buried if collection service is not restored. If unpaved yard areas are available, keep a shovel handy for this purpose. Do not dump garbage on the ground, because that attracts rats and other scavengers. Dig a hole deep enough to cover it with at least 12 to 24 inches of dirt, which will prevent insect breeding and discourage animals from digging it up.

(d) Do not establish a community dump without permission from proper authorities. Garbage dumps quickly become infested with rats capable of carrying disease germs over a wide area. If necessary, local civil defense authorities will pick sites where refuse may be left for supervised burning or burial as soon as conditions permit. Ask your warden about this if the need arises.

(e) Other rubbish may be burned in open yard areas or left at dumps established by local authorities. Cans should be flattened to reduce their bulk. Do not deposit ashes or rubbish in streets or alleyways without permission. Such material may interfere with the emergency movement and operation of fire-fighting and other civil defense equipment.

Prepare Now To Take Care of Yourself and Your Family

Unsanitary conditions can disable you even if you are safe from direct attack. If an emergency occurs, keep calm. Drink only water that you know is safe. Eat only safe food that has been prepared under safe conditions. If you cannot be sure that the things you want to eat or drink are safe, go without until help comes.

Part of our country's security lies in its technical skill to insure production, safe preparation, and distribution of food. If your area is stricken, experts in mass feeding, health, and sanitation will be helping you within a matter of hours.

Prepare now to take care of yourself and your family in the meantime. If your home resources fail, don't lose your head. Do the best you can to eat and drink sensibly and protect your health until civil defense services can reach you.

An enemy attack would be primarily an attack against people. Illness and epidemics would be part of that attack. Its aim would be to knock the civilian population out of the war. Don't help the enemy by putting yourself out of action through carelessness. Emergency feeding and sanitation measures can keep your family on its feet, ready and able to fight back, no matter what happens to your community.

Here's What You Need for Emergency Sanitation

1. Stored drinking water or other liquids to quench thirst (one gallon for each member of your family, plus an extra gallon for each child under three years of age).
2. At least a three-day supply of proper foods for your family, including milk. (This can include food already in your refrigerator, plus canned or packaged foods on your cupboard shelves.) If you are stocking a shelter, store enough food for two or three weeks. Also store paper plates and napkins.
3. Towels for emergency table use, plus cooking and

eating utensils, measuring cup, can and bottle openers, pocket knife, and matches.

4. Canned milk for baby, and emergency canned foods for diabetics or others requiring special diets.
5. Large covered garbage can (20-gallon size, if you are a householder) to keep garbage until it can be disposed of.
6. Smaller garbage can with tight-fitting lid (10-gallon size) as a container for human wastes.
7. A covered pail or other receptacle that can be used for bathroom purposes if water is not available to flush household toilets.
8. A supply of soap, toilet tissue, sanitary napkins, and disposable diapers, (if there is a baby in the house).
9. If there is illness in the family, spare rubber sheeting, extra medicines, and a reserve supply of any special equipment needed by the patient.
10. A supply of grocery bags (large) and a week's accumulation of daily papers, for soil bags, garbage wrappers, and other sanitary purposes.
11. Household chlorine solution (two pints) for purifying drinking water, and one quart of five percent DDT solution for use against insects.
12. Screwdriver, wrench (for turning off valve on house water service line) and shovel (for burying garbage and other wastes).

Refer to the Check-lists in Appendix C
for more details

Here's What You Can Do About Emergency Sanitation

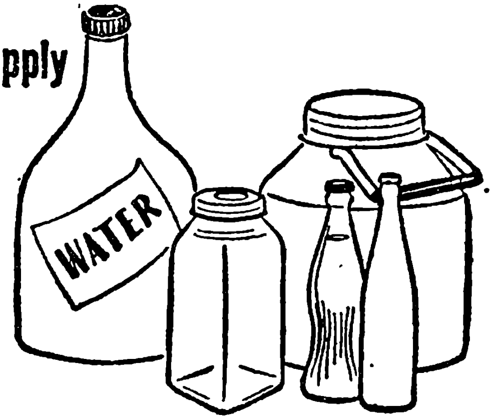
1. Drink only water or other liquids that you *know* are safe. Store right now the extra drinking water that your family might need. Don't wait for an emergency.
2. Know how to turn off the water service valve if necessary, and learn where to get water for emergency drinking, cooking, and washing if your outside supply fails.
3. Be prepared to purify water for drinking purposes in your own home, if necessary. This handbook tells you how.
4. Eat only safe foods prepared only under safe conditions. Keep at least a three-day supply on hand, and replace the things you use to keep your stock fresh and in good condition.
5. Avoid using foods or liquids that might be contaminated. Know what you can eat or drink safely.
6. Keep garbage in tightly covered containers until collection and disposal services can be restored by health authorities. If the emergency lasts for several days, bury your garbage.
7. Provide for the disposal of human wastes in covered containers in case flush toilets are not working. If the sewerage system is knocked out for more than a few days, dig an outdoor trench. Never expose human wastes to disease-carrying insects or animals. That's how epidemics start.
8. Learn how to make soil bags for emergency use if your other sanitary arrangements fail.
9. Be ready to take care of frozen foods and refrigerated food supplies if the gas and electricity are shut off. Eat or cook such foods before they spoil. Don't refreeze any frozen foods that have thawed without cooking them first.
10. Don't listen to rumors about the safety of food and water supplies, and don't pass such rumors on to others. Observe official instructions only, as relayed

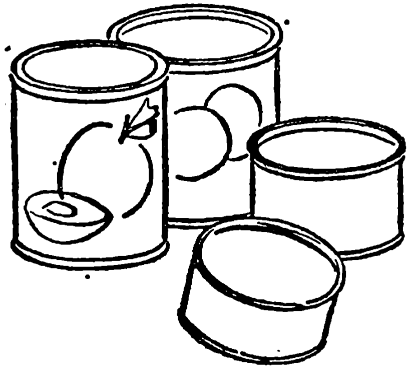
by your warden and other civil defense authorities.

You should keep your food where it will be safe from contamination. Most kitchen cabinets, pantries, or closets have doors that close tightly enough for safety.

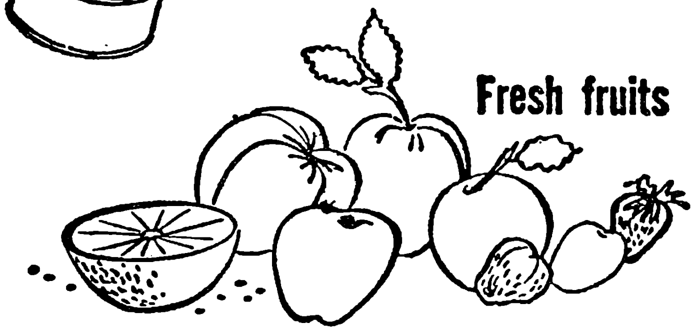
SOURCES OF LIQUIDS

Your stored water supply and bottled drinks



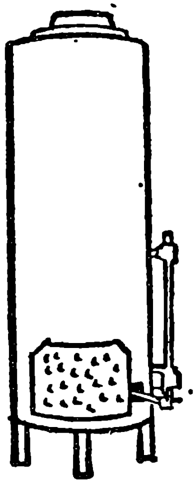


Water-packed fruits and vegetables

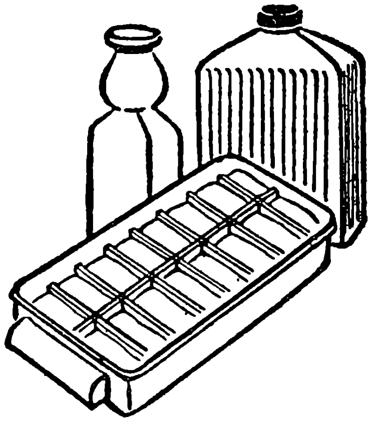


Fresh fruits

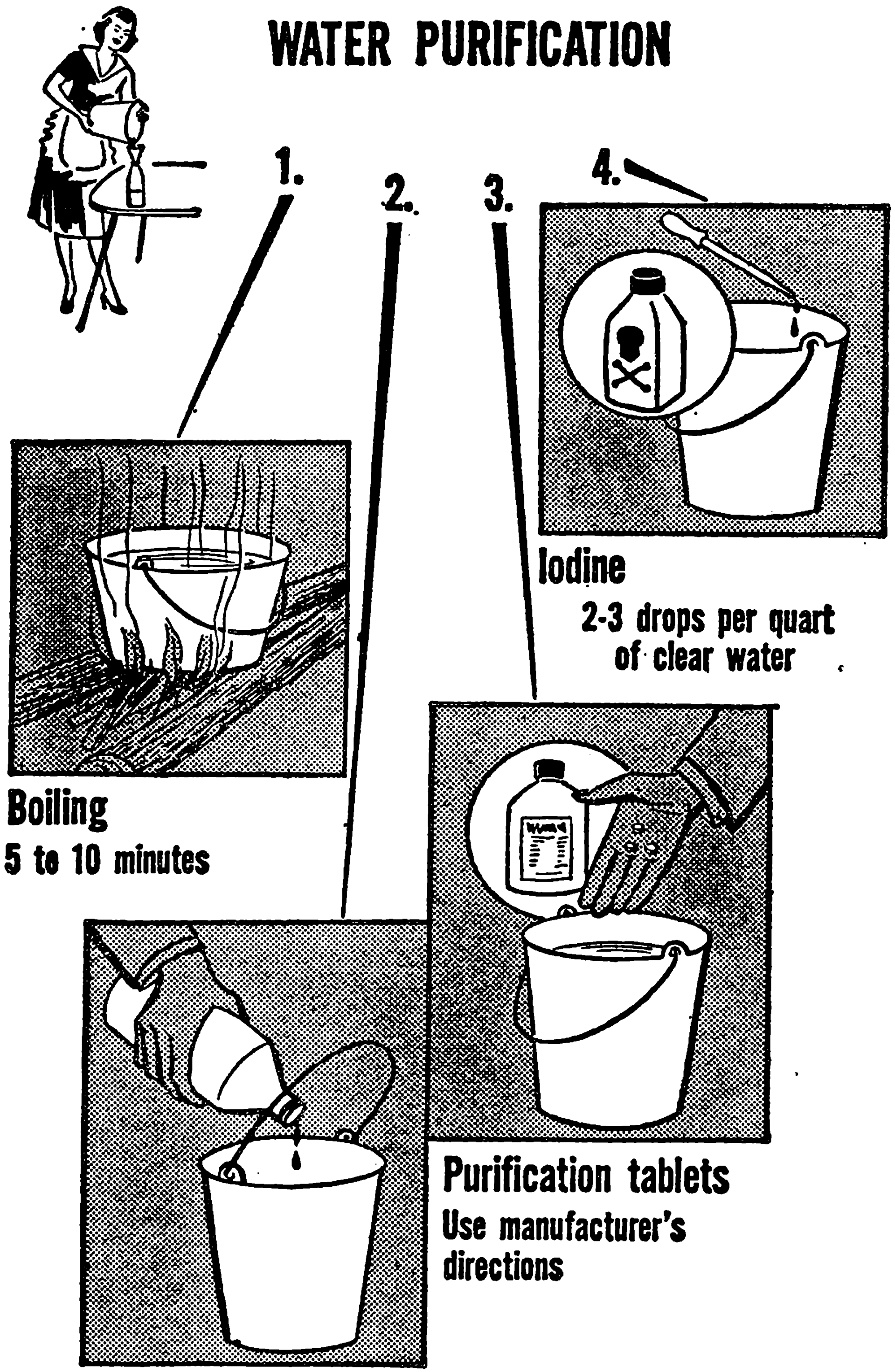
Ice cubes and liquids stored in undamaged refrigerator



Water from hot water heater, if clean



FOUR METHODS OF WATER PURIFICATION



Boiling
5 to 10 minutes

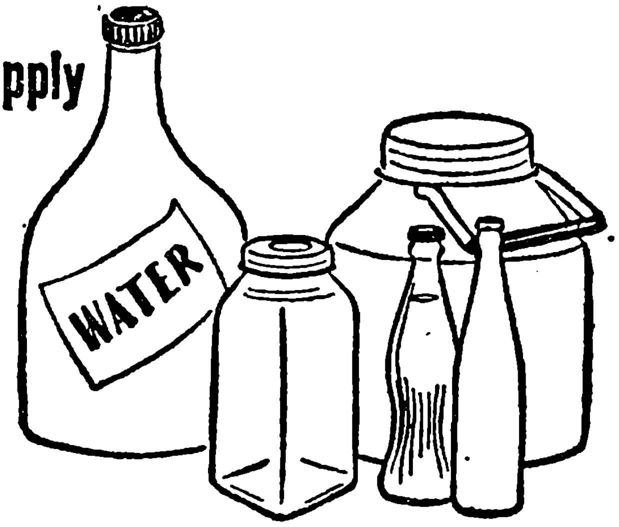
Chlorination
See TABLE for directions

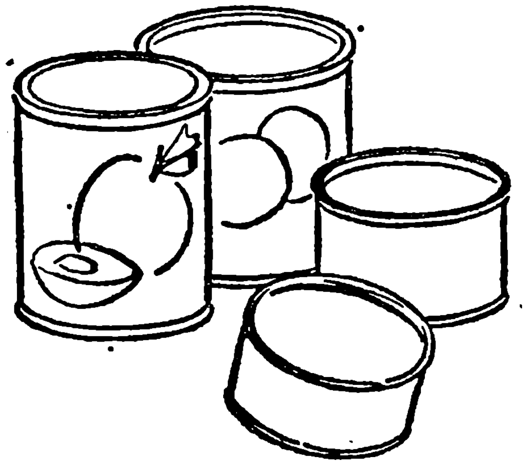
Purification tablets
Use manufacturer's directions

Iodine
2-3 drops per quart of clear water

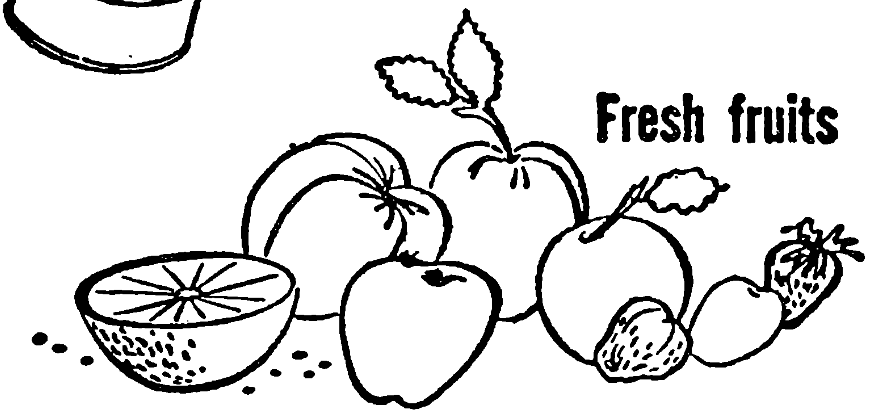
SOURCES OF LIQUIDS

Your stored water supply and bottled drinks



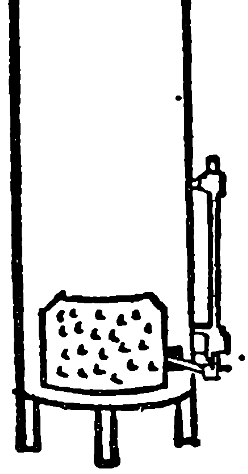


Water-packed fruits and vegetables

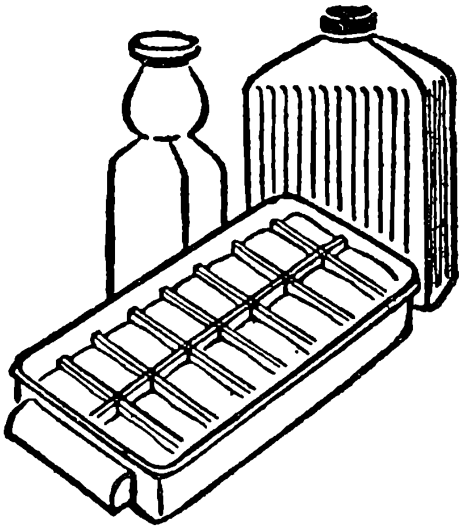


Fresh fruits

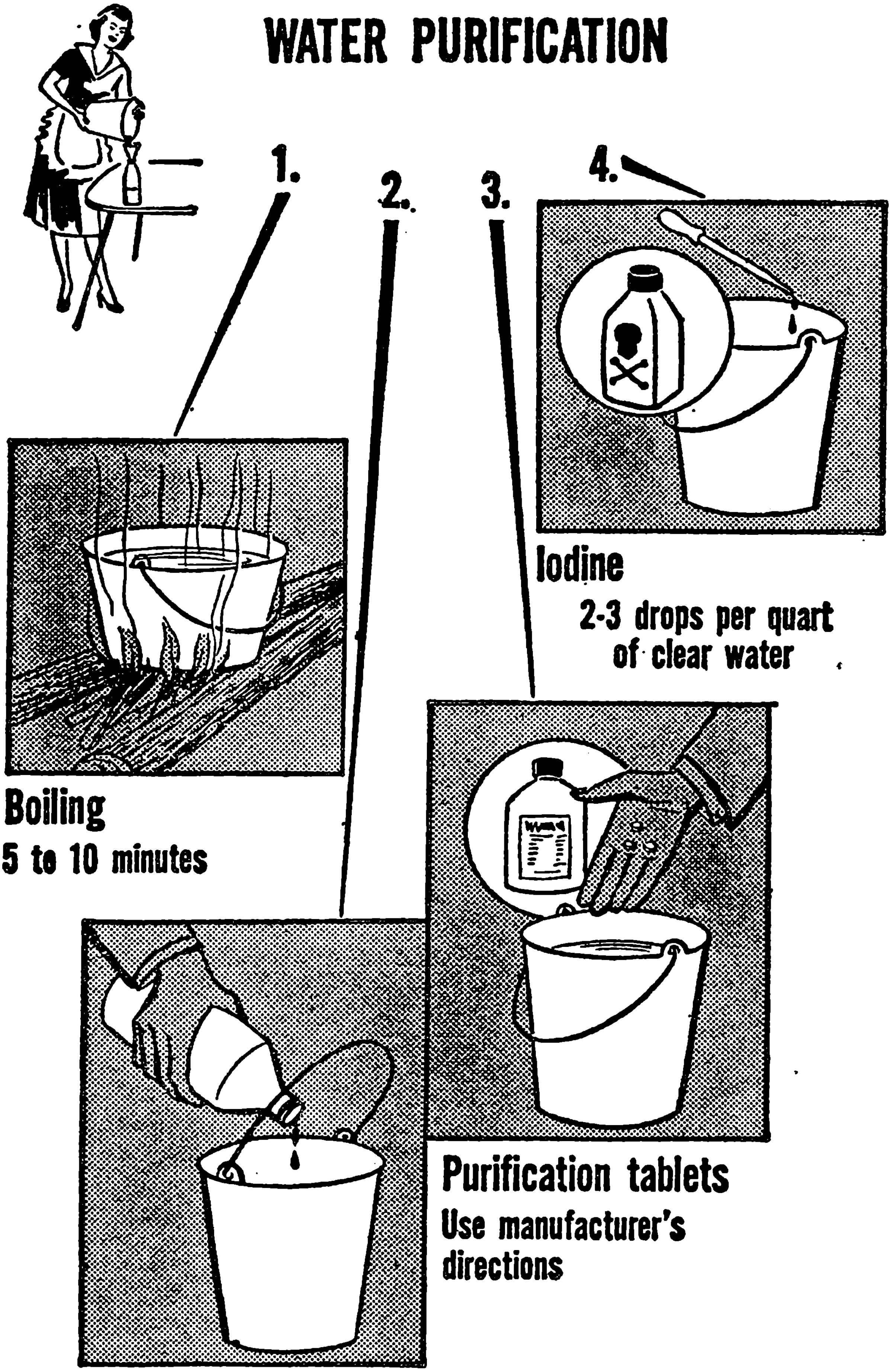
Ice cubes and liquids stored in undamaged refrigerator



Water from hot water heater, if clean



FOUR METHODS OF WATER PURIFICATION



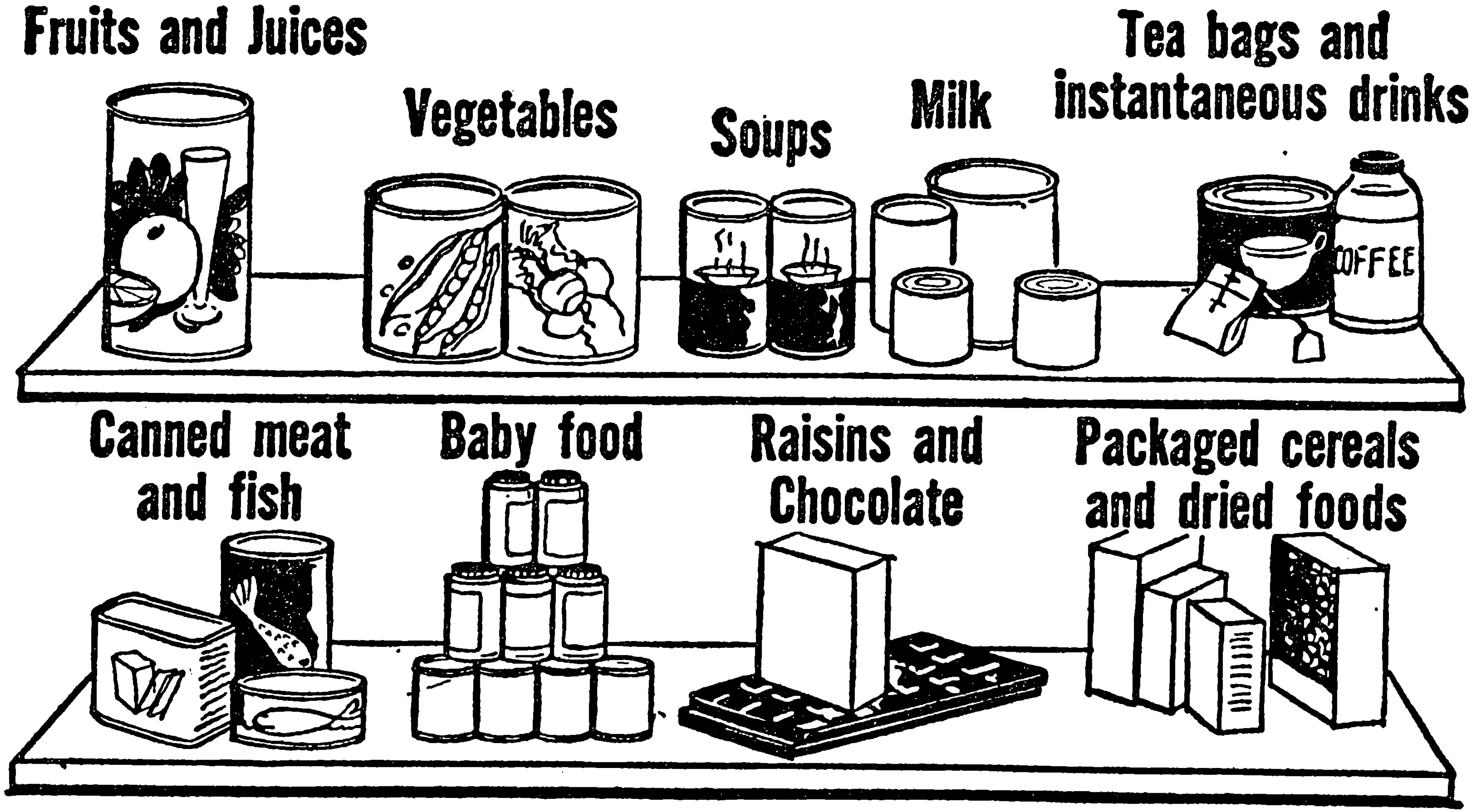
Boiling
5 to 10 minutes

Chlorination
See TABLE for directions

Purification tablets
Use manufacturer's directions

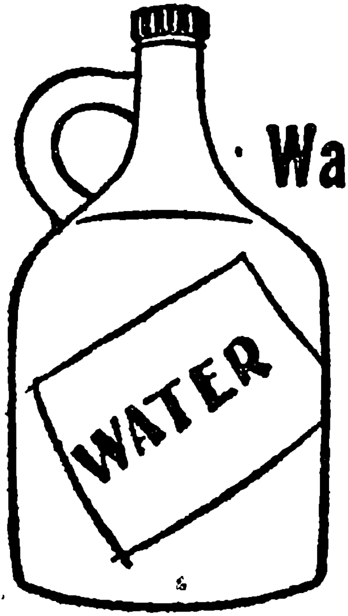
Iodine
2-3 drops per quart of clear water

A WELL-BALANCED SUPPLY OF FOOD

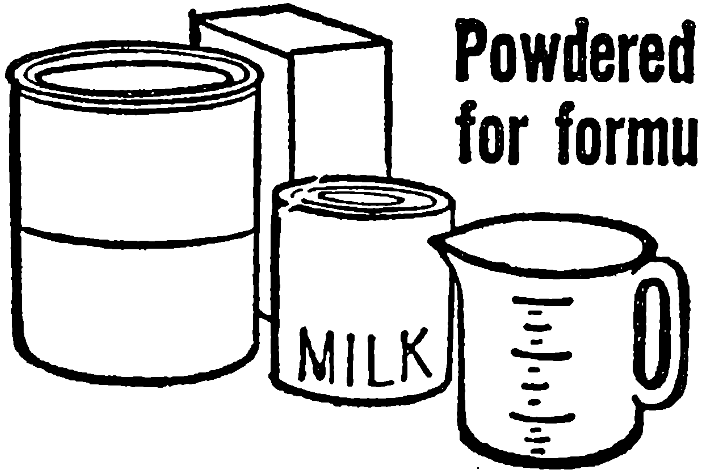

Fruits and Juices
Vegetables
Soups
Milk
Tea bags and instantaneous drinks
COFFEE
Canned meat and fish
Baby food
Raisins and Chocolate
Packaged cereals and dried foods

WHAT YOU SHOULD STORE:

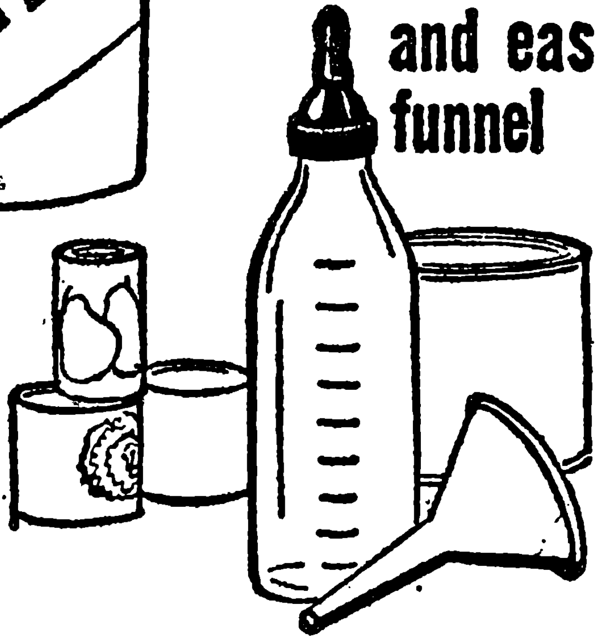
FOR YOUR BABY...



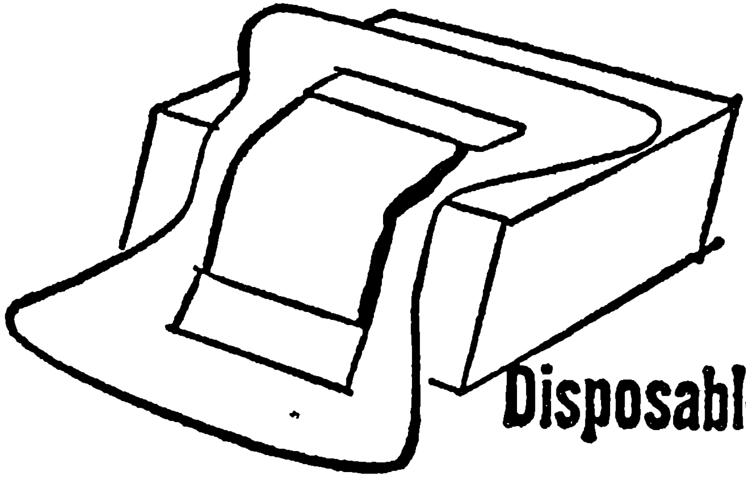
Water



Powdered mixture for formula

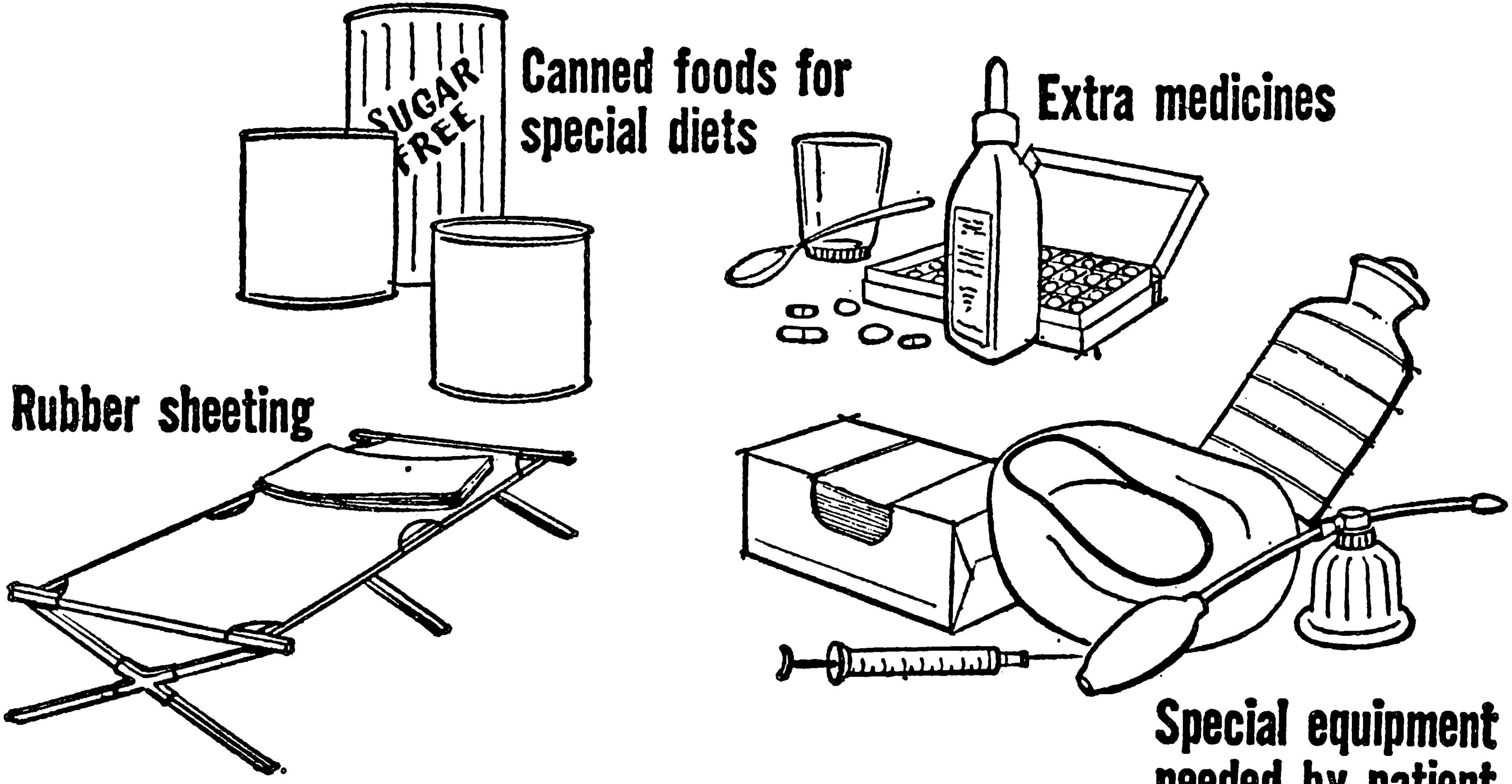


Canned or powdered milk and easily digested foods, funnel



Disposable diapers

FOR INVALIDS . . .



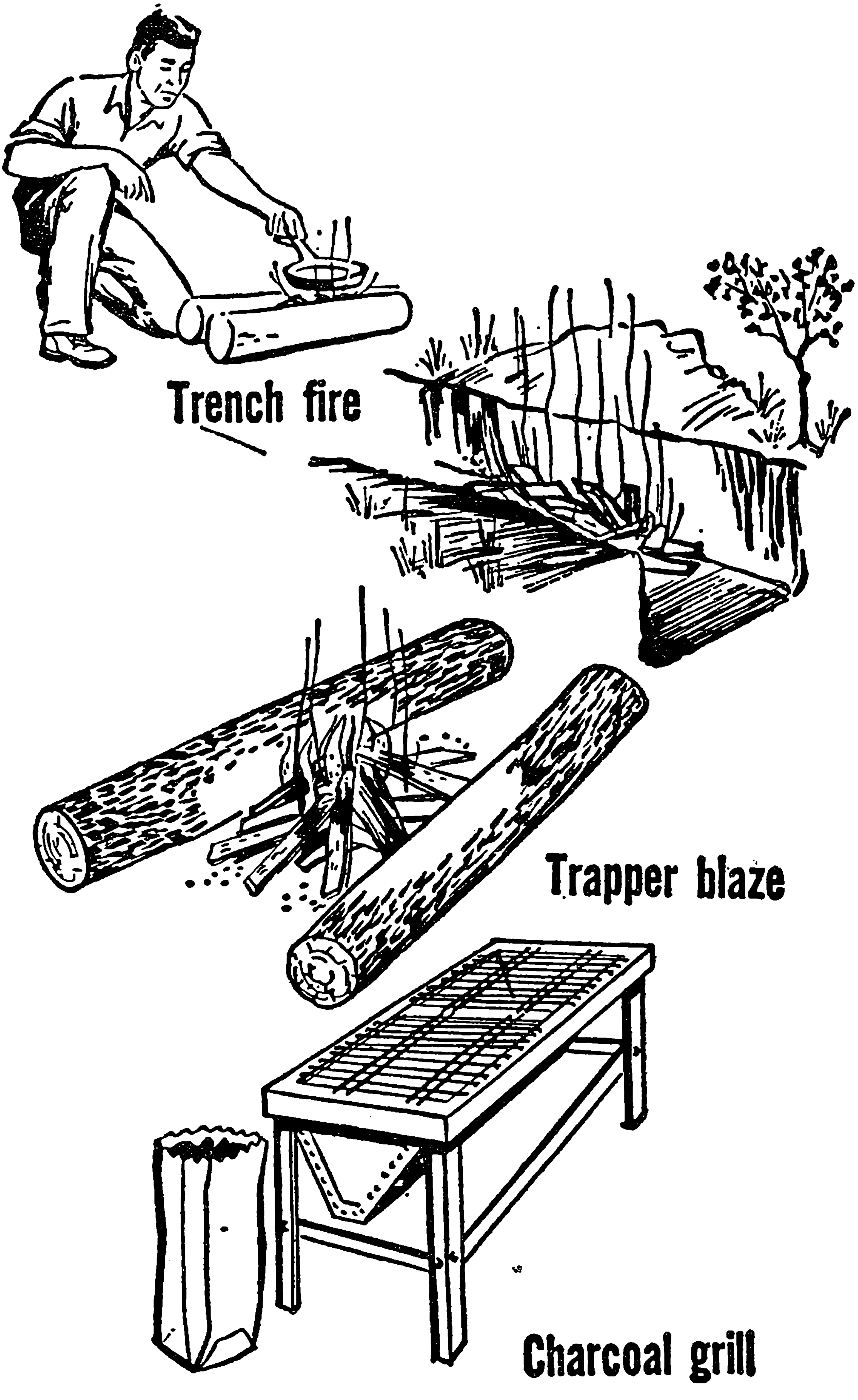
Canned foods for special diets

Extra medicines

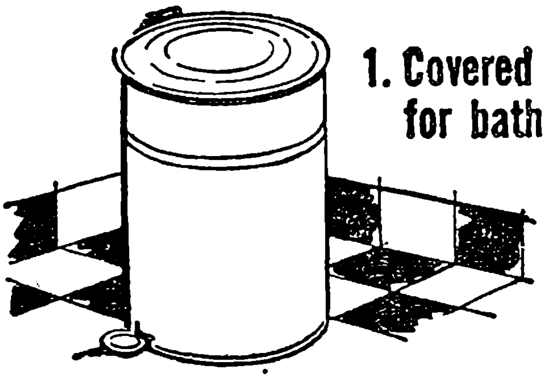
Rubber sheeting

Special equipment needed by patient

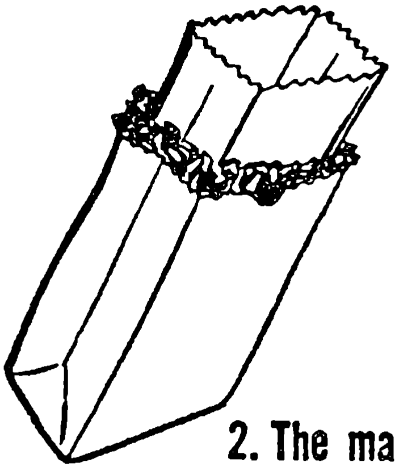
OUT-OF-DOORS COOKING


Trench fire
Trapper blaze
Charcoal grill

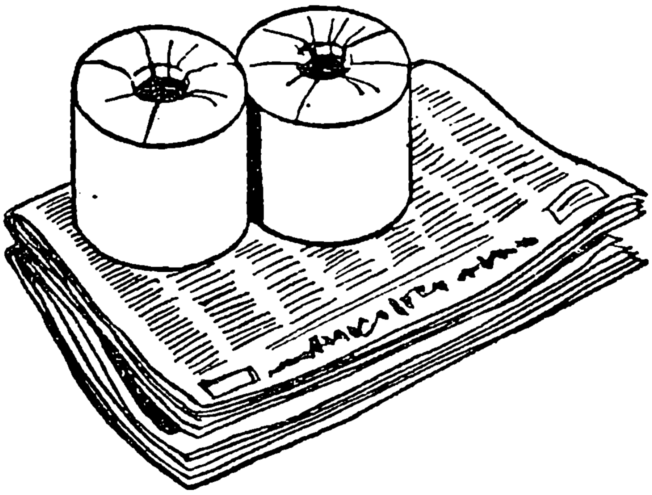
FOR PROPER SEWAGE DISPOSAL YOU WILL NEED...



1. Covered container for bathroom

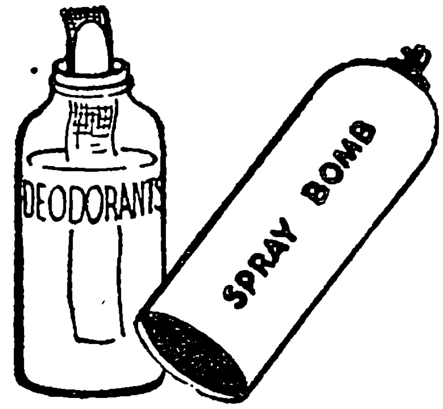


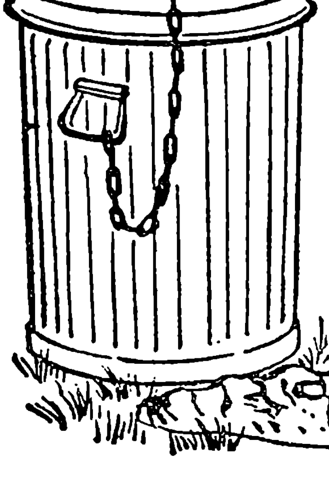
2. The materials to make soil bags



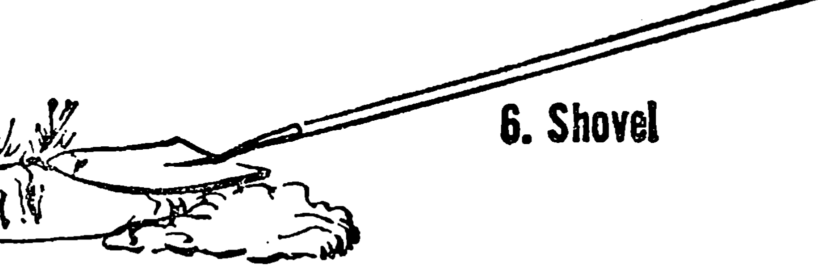
3. Newspapers, extra toilet tissue

4. Insecticide and deodorants





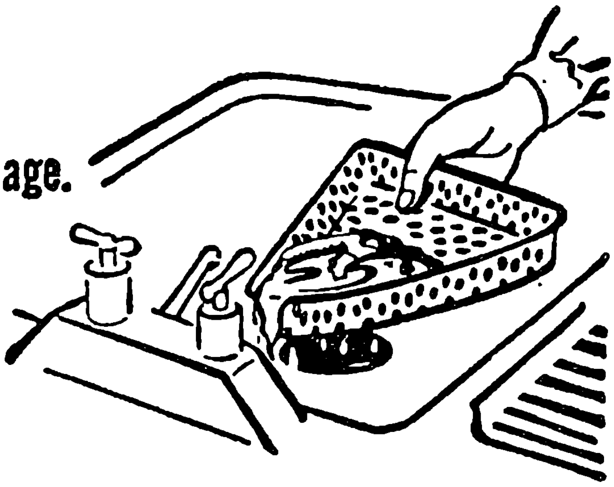
5. Tightly closed can for emergency storage of body wastes

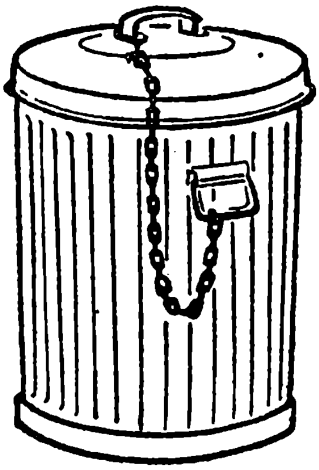


6. Shovel

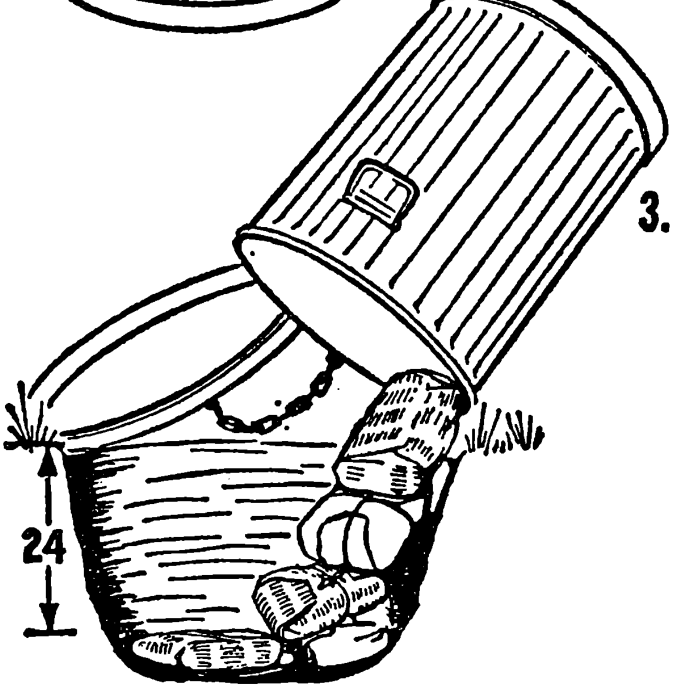
PROPER DISPOSAL OF GARBAGE AND RUBBISH

1. Liquids should be drained from garbage.

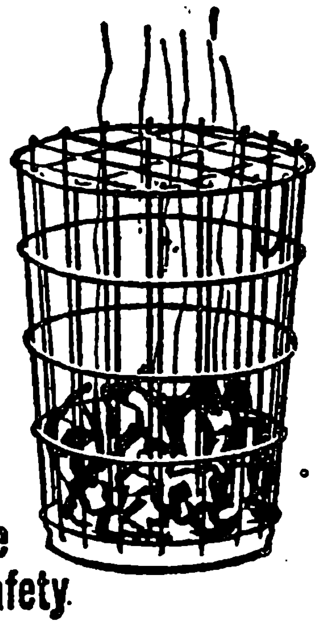




2. Garbage should be wrapped and placed in a large container with a tight lid.



3. Garbage should be buried as soon as possible under 12 to 24 inches of dirt.



4. Rubbish other than garbage may be burned . . . . but safety precautions must be taken.

CHAPTER 7

DEFENSE AGAINST BIOLOGICAL WARFARE

Biological warfare (BW) is the intentional use of living organisms or their toxic products, to cause death, disability or damage in man, animals, or plants. The target is man, either by causing his sickness or death, or through limitation of his food supplies or other agricultural crops. Man must wage a continuous fight to maintain and defend himself, his animals, and his plants in competition with insects and microorganisms. The object of BW is to overcome these efforts by deliberately distributing large numbers of organisms of native or foreign origin, or their toxic products, taking full advantage of the ability to utilize more effective methods of dissemination and unusual portals of entry.

The accentuation of health problems during and following movement of troops, workers, and evacuees with or without destruction of the normal safeguards, is well known. In describing a BW defense, consideration has been given to the need to provide and strengthen the measures used in the control of infectious diseases and pests not only in peacetime, but under war and disaster conditions. Although the natural transmission of pathogens may represent only a light skirmish when compared to intentional and unusual dissemination of exotic parasites, maintenance and expansion of the usual control programs for communicable diseases and pests is a very essential part of the total defense program.

FEASIBILITY OF BIOLOGICAL WARFARE

Extreme statements have been made about the effectiveness of BW and available defenses. Because history records emphasize the devastating action of epidemics and pandemics during wars, predictions have been made that following a successful BW attack, entire populations would become infected and disabled with a resultant high mortality. It has also been asserted that the danger would be small, since man, his animals, and his crops have survived centuries of natural exposure to infectious pathogens. In light of present knowledge, a more reasonable assessment of the hazard would place it somewhere between these two extremes. Therefore, defense planners should assume that a determined enemy can and may attack man, animals, or plants effectively by deliberately spreading pathogenic agents, covertly or overtly, alone or in combination with other weapons.

The estimations of BW potentials are speculative and controversial because evidence required for a rational appraisal will not be available until this weapon has been used. However, this lack should not prevent development of a practical defense program. Present knowledge of the epidemiology and control methods for human, animal, and plant parasites accumulated over many years by workers in preventive medicine, public health, and agriculture is believed sufficient for a reasonable and acceptable approach to BW defense planning.

A direct attack on man under ideal conditions might be extremely serious. A successful BW attack on agriculture would critically affect our economy, since it depends upon cereal and fiber crops and animals and animal products. Not only would food sources be reduced, but supplies of important animal byproducts would be curtailed.

One problem would be the stresses created by the psychological reactions of people. If a successful BW attack were discovered and widely publicized without consideration of the consequences, demoralization might result. Even if the number of casualties or the amount of damage were small, the population emotionally conditioned by the dramatic connotations of "germ warfare" might react hysterically. Even natural disease outbreaks doubtlessly would be attributed to BW. Health facilities would be overwhelmed with false and crippling alarms. Because of these dangers, BW defense planning has had to be approached cautiously and objectively.

As the vulnerability and required countermeasures differ greatly for human, animal, and plant targets, some of the factors which might govern selection of BW agents and methods for their dissemination will be discussed briefly.

SELECTION OF BIOLOGICAL WARFARE AGENTS

Man has yet to create a new pathogenic organism. He can select from many native or foreign parasites or adapt unusual mutations which meet some of the necessary requirements.

The possible potential of a given parasite under defined conditions of dosage, susceptibility, and period of exposure can be estimated within broad perimeters. What is disputable is the degree of reliance to be placed on the appraisals of the effectiveness of various agents by different authorities. However, until biological agents have been used in an actual attack, all predictions are open to question. Meteorological entities—such as wind, rain, temperature, and sunlight—interpose factors beyond human control and may make it difficult to blanket an extensive area completely with an optimum concentration of a chosen agent.

Another unknown factor which complicates defense planning is the choice which may be made by a possible enemy. With the opportunity to pick and choose, any number of agents can be used either alone or in combinations. Since they may cause reactions ranging from mild illness to death, the enemy's objective may be (1) to produce a large amount of incapacitating illnesses, or (2) to strike terror by causing high mortality. This freedom of selection naturally complicates an appraisal of the hazard and emphasizes the necessity for the broad approach, both diagnostic and therapeutic, in planning BW defense activities. To prepare for only a single agent or to consider that a determined enemy would not take full advantage of the opportunity to select his weapon would be unrealistic.

Foreign pathogenic parasites appear as the agents most likely to be used as weapons in an attack on animals or plants. Unusual parasites which can be employed as biological weapons against man are fewer in number, and it is probable that the common parasites will be favored. However, all of the lower forms which will parasitize both man and animals have potential BW characteristics, since they have two possible targets, and a large number of secondary human cases might follow an epizootic (epidemic among animals). In the list of animal infections where man may be involved are such diseases as brucellosis, glanders, the various encephalitides, Russian spring summer fever, Rocky Mountain spotted fever, psittacosis, tularemia, and plague. For many of them, eradication or control within the animal population is the only effective method of preventing human infection. Veterinarians and inspectors of meats and other animal food products may be the first to see the initial indication of BW.

Pathogens or pests suitable for BW attack against plants could be either of foreign origin or those confined to limited areas in this country. To be most effective, BW agents against plants should be capable of severely damaging important crops with no immediately available control measures. They must also be capable of persisting, accumulating, and spreading under prevailing climatic conditions, since serious losses would be expected only after several years of spread. A number of diseases and insects meeting these requirements can be used against each of our important field crops such as corn, wheat, oats, cotton, potatoes, and so forth. Losses caused by the introduction of several pathogens and pests might have serious attritional effects and might curtail the ability to export food and materials of plant origin. Partial crop failures might be brought about by a BW attack, but starvation or serious privation of any substantial part of the population is not anticipated.

DISSEMINATION OF BW AGENTS

There are many methods easily adaptable for intentional dissemination of parasites pathogenic to man. Bombs or spray tanks could be modified to create clouds of the biological material over limited targets or to blanket wide areas. Aircraft, balloons, submarines, and surface vessels could launch similar attacks using a wide variety of devices. Saboteurs could directly contaminate air, water, and food supplies. Overt attacks could probably be launched by dissemination of agents from aircraft or watercraft by aerosol spraying devices, generators, or bombs.

Animal diseases can be introduced and spread secretly, with little chance of detection, through feeds, biologics, raw garbage, and perhaps even by infected wearing apparel of man. While BW agents could probably be successfully spread among animals by aircraft, it is more probable that clandestine methods would be used. The ability of an enemy to utilize wild animals should not be overlooked.

Plants and crops can be attacked with exotic pathogenic spores used in overt methods of mass inoculation or in covert methods of establishing small foci of infection initially, with the expectations of producing serious disease or insect problems subsequently. Chemicals can also be used against plants and crops during the growing season.

The probable priority of a given method of dissemination which will be assigned by an enemy is conjectural. It will depend upon the extent to which the engineering problems can be solved, and the suitability of the procedure for various agents and targets. The efficiency of each method and its practicability would have to be appraised by a potential enemy on the basis of the estimated effectiveness, the risks involved, and the cost as compared with more conventional weapons. The wide choice available to an aggressor prevents any accurate appraisal of the threat and forces the defense planning to consider every contingency.

Covert attacks appear to be the major threats for animals and plants. Overt actions, particularly in combination with other weapons, seem to be the most likely hazard for the general human population, although covert methods could be used very effectively against key groups or industries. The ability to utilize unusual portals of entry for the introduction of pathogenic organisms or their toxic products is an important element in planning attacks on man but is believed to have only limited value for animal and plant targets. Secondary spread after introduction of the agents, while not so important in BW directed at humans, is a prime essential for insuring the success of a BW attack on animals or plants. Widespread secondary transmission among animals would create serious problems, magnified by the shipment of stock to and from market centers. In the plant field, large geographic areas might be infected by airborne spores from scattered foci. In the latter instance, timing would be very important since weather conditions have a direct and critical effect on the success of the operation.

RECOGNITION OF A BW ATTACK

To withstand a BW attack, it is essential to know quickly when, where, and what agent was used. These will be difficult questions to answer in time to initiate countermeasures. Further complications may arise by the enemy's ability to attack in a great variety of ways, either covertly or in combination with other weapons.

Air, water, food, or surfaces may be contaminated by the BW agent but accurate and rapid means for detecting and quickly identifying foreign material have not been developed. This is one of the most pressing needs in BW defense. Present methods have serious deficiencies since most require hours, days, or even weeks for identifying bacteria, viruses, and other possible agents. Entirely new procedures, apparatus, and equipment are required.

After an overt attack, opportunities probably will be afforded to obtain and examine unexploded munitions. The atmosphere or surfaces could also be sampled during or after attack. Determining the presence of BW agents in the environment during or subsequent to a covert attack presents a different problem. Two avenues are open. Physical detection of BW agents in air, water, or food, using various impinging and filtering techniques; or biological detection, employing bacteriological or immunological methods. Constant monitoring of all environment elements in the country is desirable. This is not feasible at present, but it may be considered for relatively small, well controlled areas.

Rapid recognition is hampered further by the wide variety of agents which can be employed in BW. Among the human bacterial diseases are bacillary dysentery, cholera, brucellosis, tularemia, anthrax, plague, glanders, typhoid, the leptospiroses, treponematoses, and salmonelloses. In the virus field are psittacosis, the several encephalitide, influenza, Rift Valley fever, infectious hapatitis, dengue, and smallpox. Rickettsial infections such as epidemic, endemic, and scrub typhus; Rocky Mountain spotted fever, and Q fever have been named. Fungus diseases have been included; namely, coccidioidomycosis, histoplasmosis, nocardiosis, and blastomycosis. Protozoal infections such as malaria, amebic dysintery, and toxoplasmosis have been mentioned and the toxins formed by clostridium botulinum, corynebacterium diphtheriae and various staphylococci, because of their extreme toxicity, have been suggested.

Until satisfactory physical or biological methods for environmental sampling have been developed, man himself remains the most reliable detector of agents aimed at him. The occurrence of an unusual disease or of an epidemic, therefore, may be expected as the first indication that a BW attack has been made. Prompt reporting, following by epidemiological investigations is the only practicable approach to this problem.

No new pattern is required. Individual physicians should rely upon the local health department and other laboratories for diagnostic assistance. State health departments should support the local efforts and can call upon the Regional Medical Director of the Public Health Service for assistance. He, in turn, can seek aid from the Communicable Disease and Environmental Health Centers of the Public Health Service, and the FCDA regional and national offices.

EFFECT OF BIOLOGICAL WARFARE

Covert or overt BW attacks with usual or unusual pathogens, alone or in combination, at high dosage levels, and employing unusual portals of entry may further increase the amount of disease. One of the ways in which such attacks could be projected would be through the utilization by an enemy of aerosols containing minute particles. It must be recognized that although the size of the geographic areas attacked may vary greatly, only a portion of the population will be exposed to the BW agent. Because of variations in the degree and period of exposure and of individual immunity, a still smaller fraction will become infected. The widespread provision of certain facilities for the routine and automatic protection of food and water supplies should help to reduce some hazards even further. With modern diagnostic and therapeutic methods generally available in target areas, it can also be expected that the casualties will be treated adequately unless essential facilities and communications are destroyed by other weapons.

Following a BW attack directed at man, the casualties would be confined essentially to the individuals directly exposed to the agent in the aerosol, contaminated water, food, or on surfaces. Only rarely would secondary cases constitute a problem because: (1) parasites meeting most of the BW requirements do not spread readily; (2) natural exposure would occur, hence normal body defenses will operate; and, (3) preventive countermeasures can be set in motion.

Epizootics in animals would occur more readily than epidemics in man. Many of the possible BW agents are easily transmitted from one animal to another or from herd to herd, not only by direct contact, but by feed, water, and excreta. The spread of disease is facilitated by the herding instincts of animals, their feeding habits, and their travel to and from stockyards and livestock shows. It would not be difficult to induce a widespread outbreak in a relatively short time by deliberately introducing a highly communicable agent. Foreign diseases would be particularly serious since the livestock population would lack immunity, either naturally or artificially acquired, and would be extremely susceptible. Widely scattered outbreaks of disease could be successfully established by sabotage. If many uncontrolled foci were established simultaneously, extensive epizootics might follow with significant losses of meat and other animal products.

Plant and crop damage with BW agent inoculum appears to offer only a limited threat. Few of the important plants and crops could be attacked effectively in this way. The possibility of creating epidemics of wheat stem rust has been frequently cited. But even in this instance, it is questionable whether it would be feasible to assemble and deliver the large quantities of spores required. Saboteurs will be seriously handicapped by the time required to effect extensive damage. Fortunately, an enemy possessing only distant air bases is unlikely to attack with chemical anticrop agents since the logistics and risks appear to outweigh the potential damage.

DEFENSES FOR BIOLOGICAL WARFARE

Defense methods and resources also vary. The present plan is founded on the assumption that no wholly unexpected problem will arise and that the facilities and procedures which have proved effective in the past can be adapted and strengthened to meet this threat. It demands, therefore, an intensified utilization of the agencies which have been developed to meet the problems of peacetime disease control.

Prior to an attack, emphasis must be placed on maintaining and increasing the resistance of target populations to biological agents by improving and expanding those organizations and procedures devised to improve and protect the health and well-being of our population. Even though deficiencies exist, the United States is far better equipped in this regard than many other countries. For defensive purposes, there is no need to change federal, state, and local health programs, but action should be taken to bring about an accelerated continuing improvement in facilities, equipment, procedures, and provision of trained personnel.

Until better methods are available for detecting and identifying biological agents, a practical defense during an attack is difficult to describe. Protective devices, collective and individual, used arbitrarily during overt actions, may offer some help for man. Little can be done in this regard for animals or plants.

To meet the problems arising after a BW attack, the health departments, animal and plant disease control agencies, physicians, veterinarians, and individual citizens must take part in combating the infectious agents or pests which have been introduced. Possible defensive measures to be developed include rapid detection and identification of the agent, prompt reporting of cases, protection of susceptibles, treatment or eradication of infected hosts (animals and plants), and disinfection of infected areas. The relative importance of each is quite different for human, animal, or plant populations.

Drugs, antibiotics, and biologics are available if attacks are made on man or animals. Insecticides and poisons can be used for some animal and plant parasites and pests. Quarantine and eradication are the important control procedures for animal diseases and to a lesser extent for plant infections. Detection mechanisms, individual and collective protective devices, and mass immunization can be considered for defense of man.

Since successful disease control in any host depends on rapid and accurate diagnosis—prompt reporting, quarantine, eradication when feasible, and possibly immunization—these measures have been made the basis of the animal defense program. Through the cooperation of the Bureau of Animal Industry (BAI) of the U. S. Department of Agriculture (USDA), the U. S. Livestock Sanitary Association, and the Public Health Service of the Department of Health, Education and Welfare, reporting channels are being opened within the States. In the plant field, knowledge of the biology and ecology of exotic diseases is being extended.

Provision should be made for a more rapid collection and wider interchange of information regarding the occurrence of disease, analyses and critical evaluation of such data, and for final decision that a BW attack has taken place. The FCDA, the Department of Health, Education and Welfare, and the USDA have mutually agreed to implement a system for evaluating the occurrence of disease in man, animals, and crops.

Covert attacks aimed at key personnel or specific targets by contamination of the atmosphere, water, milk, or food are difficult to counter. Personnel charged with the operation of public utilities, food processing, and preparation of biological materials should be carefully selected. An alert supervision is required at the federal, state, and local levels, including strengthening disease reporting, foreign and domestic quarantine, and border and coastal patrols.

RELEASE OF INFORMATION

Biological warfare defense and its ramifications are dynamic rather than static problems. As new knowledge is received, it may be necessary to revise the estimates of the threat and to recommend additional countermeasures. Information regarding the status of BW will be distributed to federal, state, and local civil defense health personnel as soon as it becomes available.

The term "germ warfare" has terrifying overtones which have been distorted by a flood of articles and statements, based only on a superficial knowledge of the subject. Circulation of charges that biological agents actually have been used have added to the confusion. To rectify this situation, orientation of the general public as to the real potential of BW in regard to man is most important. This requires an objective presentation, neither minimizing nor exaggerating the effectiveness of this weapon or the defensive measures which can be brought into action.

Active participation and effective cooperation of the veterinary practitioners, the state sanitary officials for livestock, and various professional associations will secure understanding of BW problems in the animal disease field. Every plant disease and pest presents a unique problem. Each should be studied by specialists and the information given to the authorities who can initiate proper control measures.

SUGGESTED COLLATERAL READING

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THE PROGRAM FOR THE DEFENSE OF MAN

The availability and application of defensive procedures differ for the country as a whole, for the population of target areas, and key industrial, defense, and governmental groups. A feasible solution for a small area, or population group, often cannot be readily multiplied or expanded to take care of a large industry, city or state. It can be easily understood that the problems of defense for a limited controlled group will not be of the magnitude or complexity of those found in the population as a whole. Certain countermeasures must be discarded or held for use in exceptional circumstances, solely because there is no way to apply them effectively in any general defense.

Federal, state, and local agencies charged with the peacetime control of human diseases will be called upon to develop and implement the BW defense program for man. Only an interested efficient local organization having the wholehearted cooperation of the practicing physicians and the individual citizen can hope to cope with the problem of improving the diagnosis, reporting, investigation of human disease, and control of the environment.

REPORTING OF DISEASES

Present channels will not be abandoned for any new reporting system. The federal, state, and local health and agricultural agencies will continue to have responsibility for insuring that accurate reports of disease are made promptly, evaluated, and circulated. The Public Health Service's National Office of Vital Statistics has taken steps to strengthen the mechanisms for reporting human diseases and deaths. The USDA will contribute information about the occurrence of animal diseases and join in evaluating all reports.

State and local health agencies have other means of recognizing unusual occurrences of disease. Absenteeism in schools and industries will often be the first sign of natural epidemics and can serve equally well as a BW warning. Reports of hospital or clinic admissions, particularly of unusual cases, also will help. Local agencies must alert their personnel, hospitals, industries, medical practitioners, and the lay public to the possibility of BW. They should stress the need for the kind of information which might provide acceptable evidence that an attack has taken place.

GENERAL COUNTERMEASURES TO BIOLOGICAL WARFARE

The broad BW defense plan has essentially the same goals as those set for customary health activities; namely, the protection of life, health, and welfare. For many years, various official and voluntary agencies have built and maintained close relationships in meeting these problems during peacetime and following natural disasters.

The same mechanisms can serve equally well to meet disease arising from the deliberate dissemination of BW agents. Careful organization in advance for the cooperative utilization of the personnel, equipment, facilities, and supplies of federal, state, and local agencies will minimize the confusion which might follow a BW attack and insure effective countermeasures.

Included in this phase of the BW defense plan are the efforts of the Public Health Service exemplified in the goal of the Sectional Research Program of the National Institute of Microbiology, to improve and make accessible the modern diagnostic and therapeutic methods; the activities of the National Office of Vital Statistics to stimulate disease reporting; and the attempts of the Communicable Disease Center to provide a nationwide epidemic intelligence service.

The desired goals can be achieved only if all health groups recognize their responsibilities. It is unrealistic to create a new super-agency concerned solely with emergency problems. Furthermore, none of the official agencies can legally relinquish their duties. It is desirable, however, to insure greater coordination and support through the organized effort of FCDA. Therefore, close and frequent contact is called for between the FCDA regional medical directors, the Public Health Service, and personnel of the state and local civil defense health services to provide maximum integration and effectiveness.

State and local health departments supervise sanitation, establish control procedures to prevent spread of infections, and to provide medical, nursing, and laboratory services for the diagnosis and treatment of disease. In event of a natural disaster, an epidemic, or a BW attack, certain additional activities may be undertaken such as:

(A) Communicable disease control:
  (1) Epidemiological investigations to determine the cause of disease outbreaks.
  (2) Establishment of isolation facilities or the imposition of quarantine.

    - (3) Provision for general immunization of the population involved.
    - (4) Disinfection and disinfestation (vector control) of structures or areas.
- (B) Sanitation:
    - (1) Provision of safe water supplies including the restoration of water systems.
    - (2) Maintenance of satisfactory milk, food, and drug supplies.
    - (3) Control of sewage and waste disposal facilities.
    - (4) Control of insects and rodents.
- (C) Emergency medical service:
    - (1) Support of local medical nursing services.
    - (2) Provide special laboratory services.
    - (3) Provide drugs, biologicals, glandular extracts, and other therapeutic materials.
- (D) Other specialized services:
    - (1) Provision of emergency housing and feeding.

The Public Health Service traditionally has assisted the various states in preventing or controlling communicable disease and in providing adequate hospitals and related medical care facilities. It maintains a foreign and interstate quarantine system to prevent the entrance and spread of disease. A system of hospitals is operated for merchant seamen and other federal beneficiaries. Medical research is conducted on a large scale. All these facilities can be used to combat BW.

SPECIFIC COUNTERMEASURES

Collective Passive Defense

Aerosols: For the general population, ordinary unsealed rooms, structures, and buildings will afford measurable protection during the passage of a seeded cloud or mist. However, if the concentration of the contaminant is high, there may be a later indoor buildup. Sealed, pressurized buildings or other shelters with forced ventilation systems, where the incoming air is passed through various kinds of impingers or filters, would furnish more effective collective protection against a BW attack. Their cost of construction and equipment, their vulnerability to blast action unless of bomb-proof design, and their dependence on electrical or other sources of power, make them impractical except under very special circumstances. Shelters with forced ventilation systems may be required for vital areas, such as communication control centers, hospitals, and command headquarters, as part of the total defense against chemical and radiological warfare. Since the specifications for chemical and radiological weapons defenses meet the requirements for BW, no special arrangements are under consideration at this time.

Investigations of large filters are continuing. If satisfactory and practicable solutions should be developed, they will be considered for civilian purposes, such as hospitals or similar institutions. The problem of defense should be recognized in the future design and construction of all buildings so that they can serve more readily as protective shelters at less cost and greater effectiveness.

Collective disinfection: Sterilization of the environment even with certain limitations, cannot be considered for large urban areas and civil populations. When an attack has been suspected, immediate use of generally accepted disinfecting procedures may be required for small enclosed spaces or structures vital for defense. These procedures appear to have little value for meeting the needs of large urban or rural areas because of the tremendous quantities of material and labor involved. In most situations, reliance must be placed on simple cleaning, drying, airing, and sunlight. The time required for detecting and identifying BW agents may exceed the viability of the agent, so that decontamination procedures usually will not be required when proof of the attack has been fully established. If a persistent agent (spore former) is used, other approaches such as heat sterilization will have to be considered.

Individual disinfection: Since the natural defenses of the human body offer significant protection, the only reasonable procedure to follow after exposure to BW agents is to remove them from the skin and clothing by washing with soap and water. Nothing can be done about materials that have been inhaled or ingested. The value of disinfecting materials for application to body surfaces has always been limited. For these reasons the recommendations must be general and fit into the usual patterns of human existence. At the moment it does not seem desirable to go beyond the accepted rules of cleanliness and personal hygiene.

Entrance of infectious enteric agents is normally gained through the ingestion of contaminated food, water, or milk. A variety of agents could be selected to deliberately infect such vehicles. The problems can be met in part by utilizing collective protective measures such as treatment of water supplies and pasteurization. Treatment of contaminated water supplies should be accomplished by filtration, chlorination, and/or boiling. Excess chlorination and subsequent dechlorination will serve even for some of the harder bacterial agents. Milk and food supplies offer special problems solved usually by pasteurization or through cooking.

Safeguarding personal supplies during an emergency is the responsibility of each individual. Fundamentally, control of water and food in BW does not differ greatly from natural disasters. Many of the solutions developed for meeting such special problems can be employed without change in BW defense.

Collective Resistance

In the modern concept of total warfare, the civilian will be exposed to disease hazards equaling and possibly exceeding those faced by the military. All of the disease control problems under emergency conditions will be encountered, exaggerated by the age range, sex differences, intercurrent disease and similar variables of civil populations. The natural hazards will be multiplied by forced evacuation or destruction of safeguards. They may be further magnified and extended as improved methods for intentional dissemination of BW materials at high dosage levels are developed and unusual routes of exposure become available.

Susceptibility and resistance to infectious agents in dealing with normal transmission are directly related to certain nonspecific factors such as housing, nutrition, and climate. Whether these will be important with the challenge of a BW attack is a matter for speculation. It is desirable to do everything practical to maintain sanitary standards as part of a total defense plan, but it does not seem reasonable to propose this specifically for BW.

Personal Passive Defense

The respiratory mucosa is vulnerable to many of the agents. Masks and treated clothing recommended for use against chemicals will provide protection for BW. However, these are of value only if warning of an attack can be given in time to don the protective devices prior to the spread and passage of the infective aerosol. Since immediate detection of BW and CW agents is so difficult, use of masks will be required arbitrarily during any overt attack. With such use and since essentially the same requirements are being met in the defense preparations for chemical warfare, no additional experimental program is proposed for BW. It should be emphasized that the normal skin and mucous membrane are efficient protective barriers against most BW agents, and ordinary clothing will also be of help.

Individual Resistance

Active immunization: The best and most certain resistance that can be obtained against an infectious agent is through active immunization. Immunization campaigns always have played a large part in the control of infectious diseases. Consequently, a wide variety of proven materials can be obtained, including toxoids, bacterial and rickettsial suspensions, and viral vaccines.

Unfortunately, effective and practical antigens have not been perfected for many of the possible BW agents. This is a characteristic which influences the selection of a parasite for a biological weapon. Likewise, immunity levels obtainable with the accepted antigens and methods may not hold against the challenge of high dosage and unusual exposures.

However, this defense has been carefully weighed for possible use in the civilian population since there is the hope that modification if not prevention of disease can be secured. Due to certain inherent limitations in such procedures, FCDA reached a decision not to propose or recommend for the present, any extraordinary programs of mass immunizations as part of the civil defense plan against BW. The first obstacle was the number of preparations which would be required and the danger of side reactions. If single antigens or several injections are necessary, the burden for the available professional personnel, already in short supply, would be overwhelming.

The second is the resistance and lack of cooperation which would be encountered. In the customary peacetime programs for civilians, health agencies find it extremely difficult to secure participations, particularly with adults. It can be achieved easily only with limited controlled groups, such as school children, industrial employees, or licensed workers. After a child leaves school, it is usually impossible to give either booster or primary stimuli unless there is a disaster or an epidemic. During such periods greater heed may be given to the pleas of competent authorities.

However, active immunization as a possible countermeasure will not be discarded. In the planning of federal, state, and local defense programs, emphasis will be given to the need for expanding and improving civilian practices. For the time being, the initiative for implementing this defense must remain with the established health organizations. The Associaton of State and Territorial Health Officers already has recommended larger and more intensive immunization campaigns for children, particularly against diphtheria, tetanus, typhoid, and pertussis. The American

College of Surgeons has asked for a greater use of smallpox, tetanus, and typhoid antigens among industrial workers. Lastly, it has been recognized that because of their duties, certain individuals may have unusual exposures and should be protected to the same degree as the Armed Forces.

At the same time, since any program will be the direct responsibility of local health departments, the organization and operation now of limited campaigns will help prepare personnel and the people for future emergencies. Even if there were no threat of BW, maintenance of high immunity levels in the general population would be required in the event of forced evacuation or destruction of normal safeguards.

Passive immunization: Another possible defense measure is the use of antisera for prophylaxis following a BW attack. Again, many obstacles will be encountered. Rapid detection and satisfactory identification of the BW agents has yet to be solved. Time is needed to assemble and administer adequate dosages of the required antisera. Practical antisera or methods of mass production have not been developed for many of the BW agents. Finally, the problems of sensitization come to the fore in any unlimited or widespread use of sera. To logistically plan or implement a program of this magnitude for the general population is practically impossible with the limited facilities of FCDA.

This procedure would warrant greater consideration if it were possible to confine it to the individuals at risk. In that event, certain of the limiting factors could be disregarded and the inherent hazards accepted. It is also a measure which might be employed arbitrarily for key civilian groups if a BW attack is detected. The recommendation for such limited use would depend directly upon the rapidity of recognition and identification of the agent, the availability of the appropriate antisera, and the size of the group to be given the prophylactic treatment.

Prophylactic drugs and antibiotics: Successful use of certain chemical compounds and antibiotics in prevention and control of some infectious diseases brings another possible countermeasure. If effective and feasible mass programs could be implemented, BW casualties might be prevented or minimized. Unfortunately, many of the biological agents are not affected by the readily available drugs which have been employed. Undoubtedly, resistant strains of susceptible organisms also would be selected for deliberate dissemination.

Therapy: Pending the development of better detection methods it must be accepted that the appearance of human cases may be the first indication of a BW attack. Consequently, as part of the BW defense plan, the requirements for therapeutic materials must be anticipated. At present, provision of a wide variety of antibiotics appears to be the most satisfactory approach. Therefore, the distribution of therapeutic agents in federal stockpiles has been based on possible needs for BW as well as providing for other types of injuries. Many state civil defense programs have made similar allocations.

Much can be done by the individual citizen. He should know the simple rules of hygiene and sanitation which will form his principal bulwark. He should be made aware of the value and the limitations of immunization and prophylactic procedures. He should recognize the need for seeking prompt medical care. Only with his understanding and support can the required improvements in health facilities be obtained to complete a BW defense.

CHAPTER 8

THE FAMILY FALLOUT SHELTER

In a sneak attack, or where sufficient warning cannot be given for evacuation, any shelter is better than no shelter. Even though you live far enough outside a target area to be relatively safe from blast and fire, there is still plenty of chance that you will be subjected to radioactive fallout from the bomb cloud. Fallout respects no person and no place. There is not a home in America that could not be affected after a nuclear attack. Shelter from fallout is the greatest single protection you can provide for yourself and your family.

WHERE WOULD YOU GO TO FIND SAFETY?

Let us assume that you have taken no steps whatsoever to provide your family with a prepared shelter. If you live in an ordinary house without basement, your safest place would be a first-floor area with the least exterior exposure—such as an interior bath, utility room or hallway near the center of the house. Outside doors and windows should be shielded as much as possible and you could assume that under such circumstances radiation would probably be cut in half. If concentration is at all heavy this would not provide a sufficient margin of safety, and you would have to be rescued pretty quickly and removed to a more adequate shelter.

Large buildings—apartment or office buildings—give good protection. Their masonry or concrete construction generally makes it harder for radiation to get through. Basements, inside rooms, or corridors are safest.

Outdoors, a culvert that can be blocked off at both ends will furnish protection, provided there is no possibility of flooding in the event of heavy rainfall. Otherwise it might turn out to be not only uncomfortable, but dangerous. A trench or ditch also will protect you if it can be covered quickly with three feet of earth or other heavy compact materials.

If your home has a basement, staying there will reduce your exposure to about one-tenth of the outside exposure and sandbagging the basement windows and exterior entrances and banking exposed walls with earth will result in a further reduction. A good safety measure against building collapse would be to build a lean-to shelter in the basement, or to have a strong table to duck under in the inside shelter area.

If you arrange a basement refuge with a mass of material around and above you, such as sandbags, bagged earth or unmortared loose brick, you can reduce your exposure to about one-hundredth of the outside exposure.

None of these can exactly be dignified by the name of Fallout Shelter, but they are all, in varying degrees, areas of reduced exposure, and as such have each some merit as pre-selected points to which to retire, at least for temporary relief and protection. Remember that radioactive dust is lethal; that any shielding, however inadequate, which blocks out its access is a step in the direction of safety. If you have reason to believe you have some of the radioactive dust on you, take no chances—remove your outer clothing and bathe the exposed parts of your person immediately, using strong soap if possible. If you can't wash your clothes as well, leave them outside.

Remember, the more dense material you put between yourself and the fallout, the better protected you are. This can be earth, sand, or other compacted building material. In a pinch, it can be stacks of books, magazines, newspapers, or filing cabinets. Stop the doors and windows tightly and barricade or otherwise close them in if possible, for fallout will sift into your house or shelter like dust. And keep well away from all windows and glazed exterior openings, for the destructive effect of flying glass will be unbelievable.

THE FAMILY SHELTER

Adequate shielding is the only effective means of preventing radiation casualties. This is the conclusion arrived at by a committee of the National Academy of Sciences in a recent study of National preparedness, and it is directly in line with previous findings by the various government agencies.

In any locality in the United States, fallout could require occupants to remain in shelter for two weeks or more. In many areas, radiation levels may permit leaving shelter for intermittent periods or permanently after two or three days. However, since the intensity of fallout at any specific place is impossible to predict prior to an attack, it is advisable to plan for a two-week occupancy. The Federal Civil Defense Administration assumes that prime targets for attack will probably be bases of military retaliation, other important military installations, and concentrations of population and industry.

Certain basic specifications have been set up as standards for fallout shelters, and these basic specifications have been applied to the family shelters which we are now about to describe.

STANDARDS FOR FALLOUT SHELTERS

Shelter Dimensions

The shelter should provide for each occupant at least 12½ square feet of floor area and 80 cubic feet of volume. In general, ceiling heights should not be less than 6½ feet. The width of the entranceway should be kept to an absolute minimum, usually not more than two feet. Certain factors which may be used for shelter capacity planning are given in Appendix B, Table V, page 285.

Shielding

(a) The shielding must have enough mass to reduce gamma radiation to a relatively harmless level. The less dense the material used, the greater the thickness required for a given degree of protection.

(b) As a general rule, a high degree of protection against gamma radiation will be afforded by an earth cover of three feet or an equivalent mass of other material or combination of materials. Approximate thickness required for other materials to afford protection equivalent to three feet of earth are: concrete, 24 inches; iron and steel, seven and one-half inches; and lead, three inches. Further information is given in Appendix B, Table II, page 282, and Table VII, pages 287-8.

(c) The arrangement of the entranceway is important since harmful amounts of radiation may be scattered around corners. Therefore, the designs of the entranceways, shown on the pertinent drawings, should not be altered. It may be noted from the drawings that the radiation must make at least two right-angled turns before entering the main chamber. These changes of direction effectively reduce the intensity of radiation.

Ventilation

The following are important considerations in the ventilation of shelters:

(a) Oxygen supply is generally not a critical factor. Carbon dioxide is. The carbon dioxide concentration should not exceed three percent by volume, and preferably should be maintained below two percent by volume. Three cfm per person of fresh air will maintain acceptable concentrations of both oxygen and carbon dioxide.

(b) A combination of high temperature and high humidity in a shelter may be hazardous. An effective temperature of eighty-five degrees Fahrenheit should not be exceeded.

(c) If recommended sanitation and ventilation standards are followed, odors within a shelter should not be unacceptable under a short-term emergency situation.

(d) The installation of equipment for the artificial cooling of air, for shelter purposes only, should be avoided if possible.

(e) A heating system generally is not essential. Use of blankets, heavy clothing, etc., for warmth usually will suffice when outside air temperatures are low.

Means of Providing Ventilation

(a) In a basement shelter, a tolerable and safe environment may be obtained by providing the means for natural ventilation, such as a grilled entrance door. Underground shelters, however, require the use of mechanical blowers or fans.

(b) The shelter ventilation system should be capable of supplying not less than three cubic feet of fresh air per minute per person in the main chamber, and means should be provided to exhaust the stale air. The actual intake of air which should be supplied to the shelter at any given time depends to a large extent on outside temperature conditions. For warmer temperatures, five cubic feet per minute per person is desirable. However, colder outside air may require a reduction in the amount delivered to the shelter, but this should never be less than three cubic feet of fresh air per minute per person. If practicable, the ventilating system should create a slight overpressure inside the shelter to prevent the infiltration of contaminated particles. The use of fuel-burning apparatus in the shelter area should be avoided.

(c) Suitable ventilating blowers or fans are commercially available at nominal cost (see Appendix B, Table VI, page 286). Hand-operated centrifugal blowers of the type used in blacksmith forges have appropriate pressure-capacity characteristics. At a somewhat higher cost, small positive-displacement rotary blowers may be obtained with alternative hand-crank or electric motor drives, the latter feature being optional. While continuous operation of the ventilating blower at peak capacity would be best, intermittent operation on a short time cycle may be satisfactory. However, if the blower in a closed shelter is not operated for periods exceeding two hours, hazardous air conditions may result.

(d) Dry-type air filters with cells or canisters containing a pleated filter material made of cellulose-asbestos or fine glass fibers are preferred for use in the ventilating systems. (see Appendix B, Table VI, page 286)

Other Important Considerations

While the foregoing basic requirements are intended to provide a safety factor which will be adequate for all types of shelters, including detached, completely sealed underground shelters, it is unlikely that a simple basement shelter for a family group of three or four persons, would require such elaborate treatment. There are, however, certain important considerations common to each type of shelter.

The entrance must have at least one right-angle turn. Radiation scatters somewhat like light. Some will go around a corner, the rest continuing in a straight line. Therefore, sharp turns in a shelter entrance will reduce radiation intensity inside the shelter.

Ventilation is provided in a concrete block basement shelter by vents in the wall and by the open entrance. A blower may be installed to increase comfort. (A blower is essential for the double-wall shelter and for the underground shelters. It should provide not less than three cubic feet per minute of air per person. Vent pipes also are necessary but filters are not.)

If there are outside windows in the basement corner where you build a shelter, they should be shielded as shown in Appendix A, Plate 14, page 276. Other basement windows should be blocked when an emergency threatens. Basement walls that project above the ground should be shielded (also shown in Plate 14).

In these shelters the entrance should be not more than two feet wide. Bunks, or materials to build them, may have to be put inside the enclosure before the shelter walls are completed.

These various factors have all been taken into consideration in each of the shelters described in the following pages, and adequate provision has been made for them.

MAKING A SHELTER HABITABLE

Once the shelter has been constructed, it will probably contain no other facilities for living than the bunks which have been built into it during construction. Now it will be necessary to equip it so that it is ready for instant use and for an adequate length of time. Some of these requirements have been covered in previous chapters on sanitation and food supply, which should again be referred to. The various check lists in Appendix C are also of value. Particular attention should, however, be given to the following points listed.

Radio Equipment

A battery-operated radio is necessary equipment for the shelter. If it is to be stored there, precautions should be taken to prevent its deterioration. A supply of spare batteries is highly desirable. Since batteries also deteriorate with time, replacements should be made at least once a year. The shielding required for radiation protection also drastically curtails effective radio reception. For this reason, radios used in shelters may require an antenna outside of the shelter itself. Since portable radios are made with widely differing circuit characteristics, it is impracticable to describe a single type antenna system suitable for all radios. However, two methods that have proven satisfactory with the radios tested are:

(a) Placing the radio near the underside of the entrance door.
(b) Running a lead-in wire from an outside antenna into the shelter, wrapping it several times around the radio in the direction that gives the best reception, and then grounding the end of the lead-in wire.

If neither of these methods proves successful, a local radio serviceman should be contacted for information on the most appropriate antenna system.

Food And Water Supply

At least a two-week supply of food and water should be available. This may be required for survival even though the radiation level permits leaving shelter in less than two weeks, since food may not be immediately available from normal sources. Foods that can be eaten without cooking are preferred. Packages of food should be in sizes which will meet the needs of one meal only. At least one-half gallon of water per person per day is needed for drinking and sanitation purposes. Gallon glass jugs, tightly capped, and carefully packaged to prevent breaking are recommended for long-term storage.

Sanitation

The sanitary disposal of human wastes is necessary for health protection. A small container such as a hospital bedpan or other emergency toilet facilities, should be provided. Contents should be disposed of in a covered watertight container. At least two five-gallon containers are required for the initial shelter period. Following this period it may be possible to leave the shelter for short periods for disposal. These containers should be charged with a small amount of lime and water for odor control. A ten-gallon covered container for food refuse also should be included.

Lighting

Continuous low level lighting may be provided in the shelter by means of a four-cell hot shot battery to which is wired a 150 milliampere flashlight-type bulb. Tests have shown that such a device, with a fresh battery, will furnish light continuously for at least ten days. With a spare battery, a source of light for two weeks or more would be assured. A flashlight or electric lantern also should be available for those periods when a brighter light is needed.

There should also be a regular electrical outlet in the shelter, as power may continue in many areas. Remember that high-wattage equipment, such as electric heaters, hot plates and toasters have heavy current demands and should not all be plugged in at once if there is only a single circuit.

Miscellaneous Supplies

Other supplies that should be available include: a first aid kit; cots, bunks, or sleeping bags; blankets; (don't forget a flashlight and an extra supply of batteries, or a hand operated generator type of flashlight); can and bottle openers; eating utensils; toilet tissue, towels, and soap; and household tools. Complete shelter checklists are provided in Appendix C.

FALLOUT SHELTER TYPES

There are three general types of family fallout shelters: the basement shelter, the underground shelter, and the aboveground shelter. Various types of materials may be used, provided sufficient mass thickness is present. A brief table of the mass thicknesses of various common materials is given in Appendix B, Table VII, page 287. (See also Table II, page 282). Concrete, bricks, earth or sand are some of the materials heavy enough to afford protection by absorbing radiation. There is about the same amount of shielding in eight inches of concrete, for instance, as in twelve inches of earth, sixteen inches of books, or thirty inches of wood. In most of the country, everywhere except in areas hit by the heaviest fallout, these thicknesses would give ample protection for a basement shelter.

The Basement Shelter

The basement shelter is the simplest and least costly type, and in many respects is the prototype from which others may be developed. Where this type of shelter is incorporated in the construction of a new house with a basement there are no problems, and relatively little cost is added to the overall price of the home. When it is adapted to existing houses, however, some problems may be encountered, principally in the placement of the large mass of shielding material for the roof of the structure in the restricted space, and the possibility of additional footings being required to support the extra weight. If structural conditions make it necessary to use a lesser thickness of material, then a lesser degree of protection must be accepted by the occupants.

The design of the shelter makes it useful also as a hobby shop, darkroom, snack bar, or storage room. Besides fallout protection, the shelter provides refuge from natural disasters such as tornados and hurricanes. However, it is important to remember that the primary purpose of this shelter is to protect your family against the deadly effects of radioactive fallout.

Underground Shelters

Many designs may be developed for an outside, underground, family fallout shelter which will provide reasonably adequate protection from radiation. Concrete, masonry, steel, pressure-treated wood, or other suitable construction material may be used. All of these shelters are modifications of the basic underground family fallout shelter.

Aboveground Shelters

For areas of the country where underground shelters are not feasible, an aboveground shelter should be built. Any of the materials suggested for construction of an underground structure can also be used for this shelter. The total mass of shielding material, including the material of which the shelter is constructed, should be equivalent to three feet of earth. This may be provided by covering the structure with earth or sandbags. If the arrangement of the entranceway cannot meet the standards of paragraph (c), page 157) under "Shielding," the entrance door will require sandbagging, or closure with loose concrete blocks from the inside.

Fallout can threaten more people than blast and heat in a nuclear attack.

We do not want a war. We do not know whether there will be a war. But we know that forces hostile to us possess weapons that could destroy us if we were unprepared. These weapons create a new threat—radioactive fallout—that can spread death anywhere.

That is why we must be ready.

No matter where you live, a fallout shelter is necessary insurance. It will not be needed except in emergency. But in emergency, it will be priceless—as priceless as your life.

In the succeeding pages of this handbook are directions for the construction of each type of family fallout shelter mentioned above. Some of them are simple enough to be undertaken as a do-it-yourself project. Others definitely require the services of a contractor. Because of their cheapness—ease of construction and high protection factors in relation to mass thickness requirements—clay products, concrete block, and in two cases reinforced poured concrete are the materials specified.

FALLOUT SHELTER COSTS

Type	*Material*	*Probable Cost*	*Cost Includes*
Basement—existing construction	Clay masonry	$300	Materials
Basement—existing construction	Concrete block	$150 to $200	Materials
Basement Corner Room—new construction	Brick or block	$400 to $500	Complete*
Basement—External—new construction	Brick or block	$500 to $700	Complete*
Detached Underground	Clay masonry	$800 to $1200	Complete*
Detached Underground	Concrete	$1000 to $1500	Complete*
Pre-shaped Underground	Metal	$700	Materials
Aboveground Fallout Shelter	Concrete	$700	Materials
Aboveground Fallout Shelter	Clay masonry	$900 to $1250	Complete*
Aboveground Blast and Fallout Shelter	Clay masonry	$1200 to $1700	Complete*

* *Complete* means materials and labor are both included.

These are the shelters described and illustrated in chapter 9, with plans in Appendix A.

CHAPTER 9

TYPICAL FALLOUT SHELTERS

BASEMENT SHELTER—EXISTING CONSTRUCTION, CLAY MASONRY

Approximate Cost $300 (Do-It-Yourself)

You can provide your family with substantial protection against fallout radiation with a minimum of difficulty and at reasonable cost with a clay masonry basement type fallout shelter. Basement shelters generally are the least expensive type that will provide substantial protection. The basement shelter (shown in various stages of construction in Figs. 1, 2, 3, 4 pages 180-183) can be built at a cost of about $300 by a "do-it-yourselfer" with the help of a neighbor in about two weekends. However, it is recommended that a regular building contractor be employed for the job. The approximate building time for a contractor is 32 man-hours.

If the shelter is to serve a dual purpose which requires a serving window, it will be necessary to install a lintel over the opening. Enough loose wall units must be available near the serving window to fill it in an emergency.

Shelves may be constructed along the stud wall using 1" x 8" boards. In general, the shelter should be located in the basement corner where the floor is farthest below the level of the outside ground.

It is best to avoid areas having outside windows. If it is necessary to build in this area, any windows in the basement walls must be filled with solid units or filled hollow units of the same thickness as the basement wall itself. If a window is located in a window well completely below grade, it may only be necessary to cover the window well with boards when an emergency arises and pile filled sand bags on top of them.

The entrance into the shelter should have at least one right-angle turn to reduce radiation intensity inside the shelter.

Ventilation is provided in this type of basement fallout shelter by vents in the wall and by the open entrance. A blower may be installed to increase comfort.

A practical method of building this structure is outlined by the following steps:

(1) Trace the outline (guide lines) of the shelter walls on the basement floor.

(2) Lay a course of 8″ x 8″ x 12″ clay tile, (conforming to ASTM Specifications C34, Grade LB) in ½-inch mortar joints, along the guide lines on the basement floor. The mortar shall contain one part cement, one part lime or lime putty, and six parts sand. It shall be mixed with a hoe in a mixing pan for a period of three minutes with the amount of water required to produce the desired workability.

(3) Fill the tile cells with pit-run sand.

(4) Provide ventilation holes in the second course by turning two tile units on their side as indicated in figure 2.

(5) Repeat steps No. 2 and 3 until desired wall height is attained. Notch out tile in top course to take 2″ x 6″ joists. Three courses of brick may be used in lieu of final course of tile. (See detail on line drawing, Appendix A, Plate 1, page 250). (5)

(6) Place 2″ x 4″ plate on the floor along the wall to receive 2″ x 4″ studs. Attach plate to wall with ½″ bolts, 2′ 0″ on center, and four inches from each end of plate.

(7) Attach studs with ½″ bolts to existing basement wall at the center and one foot from each end of the studs. Nail 2″ x 4″ joist support to studs.

(8) Place 2″ x 6″ joists into position and toe-nail them

to 2″ x 4″ studs and support. Brace them in position with 2″ x 4″ blocking.

(9) Allow walls to cure 24 hours prior to installation of shelter roof.

(10) Nail 1″ x 8″ board across joists and alternately stack on four courses of brick to make up the roof. Stagger the brick so that vertical joints are not above one another.

(11) Repeat step No. 10 until roof is complete.

Brick is an excellent material that can be used for the construction of fallout shelters. If brick is used for the construction of the basement shelter, step number three is eliminated. Figure 4 shows a basement shelter built of brick. Plans for this shelter are in Appendix A, Plate 1, page 250.

MATERIALS REQUIRED

ITEM	AMOUNT
2-2/3″ x 4″ x 8″ brick	2250
8″ x 8″ x 12″ structural clay tile	205
2″ x 6″ structural grade lumber	35 lineal ft.
2″ x 4″ structural grade lumber	87 lineal ft.
1″ x 8″ (1″ x 12″) wood sheathing	88 board ft.
1/2″ x 6″ steel bolts	30
16d nails, 8d nails	1 lb. each
sand	60 cu. ft.
cement	2 cu. ft.
lime (or lime putty)	2 cu. ft.

BASEMENT SHELTER—EXISTING CONSTRUCTION, CONCRETE BLOCK

Approximate Cost $150 to $200 (Do-It-Yourself)

A basement shelter can be built with solid concrete blocks as a do-it-yourself project. Material costs vary in price range from between $150 to $200. This shelter would provide all the protection needed in most of the nation. That means it would save many lives even in the areas of heaviest fallout, and most lives everywhere else.

This type of inexpensive basement shelter also can be incorporated in plans for new home construction. Other types of effective shelters can be built in new homes with relatively minor changes in design. (See Appendix A, Plate 13, page 276)

A row of solid concrete blocks is set in about three-eights of an inch of wet mortar along guidelines marked on the basement floor. The corner is built about six blocks high (Fig. 5). The remainder of the wall then is raised to the same height. The corner is built up once more and the wall again raised to its level. The wall is not raised all the way to basement ceiling. Clear space of at least 16 inches is needed overhead to permit the later construction of the shelter roof. The top rows of concrete blocks are not set on the wall until after the roof is in place.

Ventilation is provided by an open doorway and vents near the floor in one wall. The four vents are simply small gaps in one layer of blocks.

The wall protecting the shelter entrance from direct radiation should be the same height as the main shelter walls. The posts (marked "A" and "A-1" in Fig. 6) that support the roof beams are fixed to the basement walls with ½-inch anchor bolts. The height of the posts marked "A-1" should equal the height of post "A" plus the thickness of beam "B". A wall beam (marked "B" in Fig. 6) is put in place against the rear wall from one corner post to the other. The beam should be nailed to the uprights on which it rests.

The roof beams (marked "C" in Fig. 7) are installed after the mortar in the block wall has dried at least a day. One end of each roof beam is nailed to the wall beam (marked "B" in Fig. 7). The roof beams are placed on edge. Wood braces (marked "D" in Fig. 7) hold them in place.

At the entrance side of the shelter, each roof beam is rested on the inside four inches of the block wall. The outside four-inch space is filled by mortaring blocks on edge. The wooden bracing between the roof beams is placed flush with the inside of the wall. Mortar is poured between this bracing and the four-inch blocks on edge to complete the wall thickness for radiation shielding. (For details see inset, Fig. 7.)

The first one or two roof boards (marked "E" in Fig. 8) are slipped into place across the roof beams, from outside the shelter. These boards are nailed to the roof beams by reaching up through the open space between the beams, from inside the shelter. Concrete blocks are passed between the beams and put on the boards. The roof blocks are in two layers and are not mortared together.

Work on the roof continues in this way. The last roof boards are covered with blocks from outside the shelter.

When the roof blocks are all in place, the final rows of wall blocks are mortared in position. The structure is complete. (See Fig. 9.) Building plans are in Appendix A, Plate 6, page 260.

Solid concrete blocks, relatively heavy and dense, are used for this shelter. These blocks are sold in various sizes so it seldom is necessary to cut a block to fit.

Solid blocks are recommended because hollow blocks would have to be filled with concrete to give effective protection.

Bricks are an alternative. If they are used, the walls and roof should be ten inches thick to give the same protection as the eight-inch solid concrete blocks.

The method of laying a concrete block wall is illustrated in Appendix A, Plate 15, pages 278-9. More detailed instructions may be obtained from your local building supply houses and craftsmen. Other sources of information include the National Concrete Masonry Association, 38 South Dearborn Street, Chicago, Ill., the Portland Cement Association, 33 West Grand Avenue, Chicago, Ill., and the Structural Clay Products Association, Washington, D.C.

BASEMENT SHELTER—NEW CONSTRUCTION

When a fallout shelter is incorporated in the original construction of a new dwelling, there are two types available, either one of which gives the advantage of certain economies, and allows for considerable upgrading of the shielding characteristics, principally in the use of poured reinforced concrete for the roof slab. The first type uses the same plans just referred to in connection with the two previous shelters designed for existing construction, and is enclosed within the basement area; the second is outside and immediately adjacent to the basement walls.

BASEMENT CORNER ROOM

Approximate Cost $400 to $500

In this design (similar to Plates 1 and 6, Appendix A) the two exterior walls of the shelter also serve as house foundation walls and the top of the roof slab is used as the floor for a room above.

Any contractor should be able to construct the basement corner room shelter without difficulty. Special care, however, should be taken in shoring the formwork for the heavy roof slab. Although not shown on the drawing, conventional wall footings should be added under the interior walls of the shelter.

To meet recognized code requirements economically, the roof slab should be placed in two 10-inch layers. The lower layer should contain the minimum amount of reinforcing steel required by code. The upper layer is for radiation protection only, and should be placed and compacted with the same care as the structural concrete.

The shelter may be built with either a natural or mechanical ventilation system. Natural ventilation may be achieved by having two grilles or louvers about one foot square in the entrance door. One grille should be near the top and the other near the bottom of the door.

If a mechanical ventilating system is used, it should contain the same components as the basic underground family fallout shelter except that a grille in the door may be substituted for the exhaust pipe.

EXTERNAL BASEMENT SHELTER

Approximate Cost $500 to $700

New construction furnishes the home owner with an opportunity to erect a fallout shelter immediately adjacent to his basement. It will provide excellent protection against fallout radiation. This shelter is built as an extra room in the basement and would add approximately $500 to $700 to the total cost of the house.

On the basis of current Office of Civil and Defense Mobilization criteria, this shelter has a protection factor of 1,000 or more (see Table I—Appendix B), and can have multiple uses. It can serve as a refuge from natural disasters such as tornados and hurricanes.

This shelter can be made blast resistant by providing a blast-resistant, heat-reflective door at the entrance. The design already has some inherent blast resistance (approximately 5-7 psi blast overpressure). It may be necessary, however, to provide increased wall strength depending upon the desired design overpressure. A competent engineer should be employed to design this shelter to provide the additional stability.

Plans and structural details for such an external shelter are found in Appendix A. Plate 2, page 252, is for clay masonry construction, and Plate 13, page 274, for concrete block.

DETACHED UNDERGROUND SHELTERS, CLAY MASONRY

Approximate Cost $800 to $1200

An underground clay masonry fallout shelter completely detached from any building, can be built by a contractor for about $800 to $1200, depending upon the entrance used. Plate 3 in Appendix A, page 254, is the line drawing for this shelter. The shelter will provide excellent fallout protection, having a protection factor of 1,000 or more on the basis of OCDM criteria.

The line drawing (Plate 3) shows the shelter with earth mounded over the roof. This shelter can be built into an embankment or entirely below grade.

This shelter also provides excellent protection against hurricanes and tornados, and can easily be made blast resistant by providing a blast-resistant door at the entrance. It already has some inherent blast resistance (approximately 5-7 psi blast overpressure). It may be necessary, however, to provide greater stability depending upon the design overpressure. If a blast shelter is desired, it is recommended that a competent engineer be employed.

DETACHED UNDERGROUND SHELTERS, REINFORCED CONCRETE

Approximate Cost $1000 to $1500

An underground reinforced concrete shelter can be built by a contractor for about $1000 to $1500, depending on the type of entrance. The shelter shown would provide almost absolute fallout protection.

The illustration (Fig. 11) shows this shelter with the roof at ground level and mounded over. The same shelter could be built into an embankment or below ground level. Plans for the shelter, with either a stairway or hatchway entrance, are shown in Appendix A, Plates 11 and 12.

This reinforced concrete shelter has been designed to provide a high degree of protection from radioactive fallout for up to six adult occupants. The drawings show the shelter covered by an embankment two-feet three-inches high. If desired, the embankment may be eliminated by placing the roof of the shelter two-feet three-inches below ground level. The selection of which type of earth cover to use is optional since there is no significant difference in the amount of protection afforded. If the embankment is used, however, its slopes should be seeded or treated to prevent erosion.

PRE-SHAPED METAL SHELTER

Approximate Cost $700 (Materials only)

Pre-shaped corrugated metal sections, or pre-cast concrete, can be used for shelters either above or below ground. These are particularly suitable for regions where water or rock is close to the surface. They form effective fallout shelters when mounded over with earth, as shown in Figure 12.

Materials for this shelter would cost about $700. A contractor probably would be required to help build it, and his charges would be added to the cost of materials. This shelter, as shown in Appendix A, Plate 9, page 266, would provide almost absolute protection from fallout radiation. An alternate hatchway entrance, shown on Plate 10, would reduce the cost of materials $50 to $100.

The National Lumber Manufacturers Association, Washington, D.C., is developing plans to utilize specially treated lumber for underground shelter construction. The Structural Clay Products Institute, Washington, D.C., is working to develop brick and clay products suitable for shelter construction. Arriving too late for inclusion, but now available, is a publication of the Douglas Fir Plywood Association, 1119 A Street, Tacoma 2, Washington, giving data on three types of family fallout shelters, all approved by the Shelter Design and Construction office of the Department of Defense (formerly the OCDM).

BASIC UNDERGROUND SHELTER INCORPORATED INTO SMALL BUILDINGS

The basic underground family fallout shelter can be incorporated into the plans for basementless houses, garages, garden or tool houses, and the like. There are only two structural modifications required. First, the slab thickness of the roof must be increased to 20 inches, and second, a "collar" of concrete or masonry must extend above the entranceway opening in the roof slab. The reinforcing bars of the walls and floor slab must be the same as in the basic shelter.

To meet recognized code requirements economically, the roof slabs should be placed in two 10-inch layers. The lower layer should contain the minimum amount of reinforcing steel required by code. The upper layer is for radiation protection only, and it should be placed and compacted with the same care as the structural concrete.

The "collar" should have a minimum height of 12 inches and width of 12 inches. These dimensions are based on radiation considerations. Most commercially available door hatches have minimum inside dimensions of two-feet six-inches by three feet, and the collar should be made of ample size to accommodate them.

The ventilation system should contain the same components as the basic shelter; however, the intake may be located within the small building and the exhaust outside.

ABOVEGROUND SHELTERS

In regions where water or rock is close to the earth's surface, making it impractical to build underground, it may be necessary to utilize aboveground construction. Because of the presence of overpressure from a distant blast, a type of double-wall construction must be employed which is radically different from that used in the underground type of shelter. As a result the protection against fallout is exceptionally good. In order to make an aboveground shelter blast-proof as well as fallout-proof, additional measures must be taken.

ABOVEGROUND CONCRETE FALLOUT SHELTER

Approximate Cost $700 (Materials Only)

An outdoor, aboveground fallout shelter also may be built with concrete blocks. (See Fig. 13, double-wall shelter.) Most people would have to hire a contractor to build this shelter. Plans are in Appendix A, Plates 7 and 8, pp. 262-265.

Two walls of concrete blocks are constructed at least 20 inches apart. The space between them is filled with pit-run gravel or earth. The walls are held together with metal ties placed in the wet mortar as the walls are built.

The roof shown here (Fig. 13) is a six-inch slab of reinforced concrete, covered with at least 20 inches of pit-run gravel. An alternate roof, perhaps more within do-it-yourself reach, could be constructed of heavy wooden roof beams, overlaid with boards and waterproofing. It would have to be covered with at least 28 inches of pit-run gravel, and because of the great weight should not be attempted without competent engineering advice on bracing and framing.

The materials for a double-wall shelter would cost about

$700. Contractors' charges would be additional. The shelter would provide almost absolute fallout protection.

ABOVEGROUND CLAY MASONRY FALLOUT SHELTER

Approximate Cost $900 to $1250 (Complete)

An outdoor aboveground fallout shelter can be built of clay masonry units.

The exterior walls of this shelter are constructed of two wythes of brick, one-foot eight-inches apart. The space between the brick is filled with compacted pit-run sand or gravel. The two brick wythes (two independent walls of brick) are tied together with non-corrosive metal ties as indicated on the line drawing shown on Plate 4, Appendix A, page 267.

The roof is a six-inch reinforced concrete slab, having a brick parapet wall. Upon this slab is placed two coats of hot asphalt water-proofing, then 16 to 20 inches of pit-run sand or gravel fill.

This shelter will provide exceptionally good protection against fallout at a cost of about $900 to $1250. It has a protection factor of 250 to 1,000, based on OCDM criteria.

ABOVEGROUND BLAST AND FALLOUT SHELTER

Approximate Cost $1200 to $1700 (Complete)

Reinforced Brick Masonry (RBM) is employed in making the family shelter shown on Plate 5, Appendix A, page 258, resistant to blast as well as fallout. This aboveground shelter provides excellent protection against the ravages of hurricanes and tornados in addition to its radiation shielding. Most generally this type of shelter is built in regions where water or rock is close to the earth's surface, making it impractical to build underground.

A family in this shelter would be protected from a nuclear explosion of 20-megaton size as close as five miles from ground zero. Its radiation protection factor is approximately 600 to 700, based on OCDM criteria.

The exterior walls of the shelter are constructed of two wythes of brick masonry, one foot apart. One wall is a 10-inch RBM wall and the other is four inches of brick tied to the RBM wall with non-corrosive metal ties spaced as indicated on the drawing (Plate 5). The space between the brick is filled with compacted pit-run sand or gravel.

The roof is a 10-inch slab of reinforced concrete upon which is poured ten more inches of fill concrete, making a total roof thickness of 20 inches. The door is blast resistant and heat reflective, able to withstand a blast overpressure of approximately ten pounds per square inch.

Blast and fallout protection is provided by this shelter at a cost of approximately $1200 to $1700.

SHELTER IN APARTMENT BUILDINGS

Large apartment buildings of masonry or concrete provide better natural shelter than the usual family dwellings. In general, such apartments afford more protection than smaller buildings because their walls are thick and there is more space.

The central area of the ground floor of a heavily constructed apartment building, with concrete floors, should provide more fallout protection than the ordinary basement of a family dwelling. The basement of such an apartment building may provide as much natural protection as the specially constructed concrete block shelter recommended for the basement of a family dwelling.

The Federal Government is aiding local governments in several places to survey residential, commercial and industrial buildings to determine what fallout protection they would provide, and for how many people.

The problem for the city apartment dweller is primarily to plan the use of existing space. Such planning will require the cooperation of other occupants and of the apartment management. The space available should be identified and assigned to those who are to use it. The plan will work more smoothly if it is rehearsed. The owner of the building may find it necessary to modify the basement ventilation, water supply, and sanitation system.

You probably would have time to carry your family supplies from your apartment to the basement after an attack warning, before fallout arrives.

No effort has been made here to consider larger shelters of a magnitude suitable for neighborhood or community needs. For those who require the highly technical information necessary to design such structures, there is considerable material in the National Plan appendix series publication NP-10-2, "Fallout Shelter Surveys: Guide for Architects and Engineers", May 1960, available from the Office of Civil and Defense Mobilization.

Figure 1

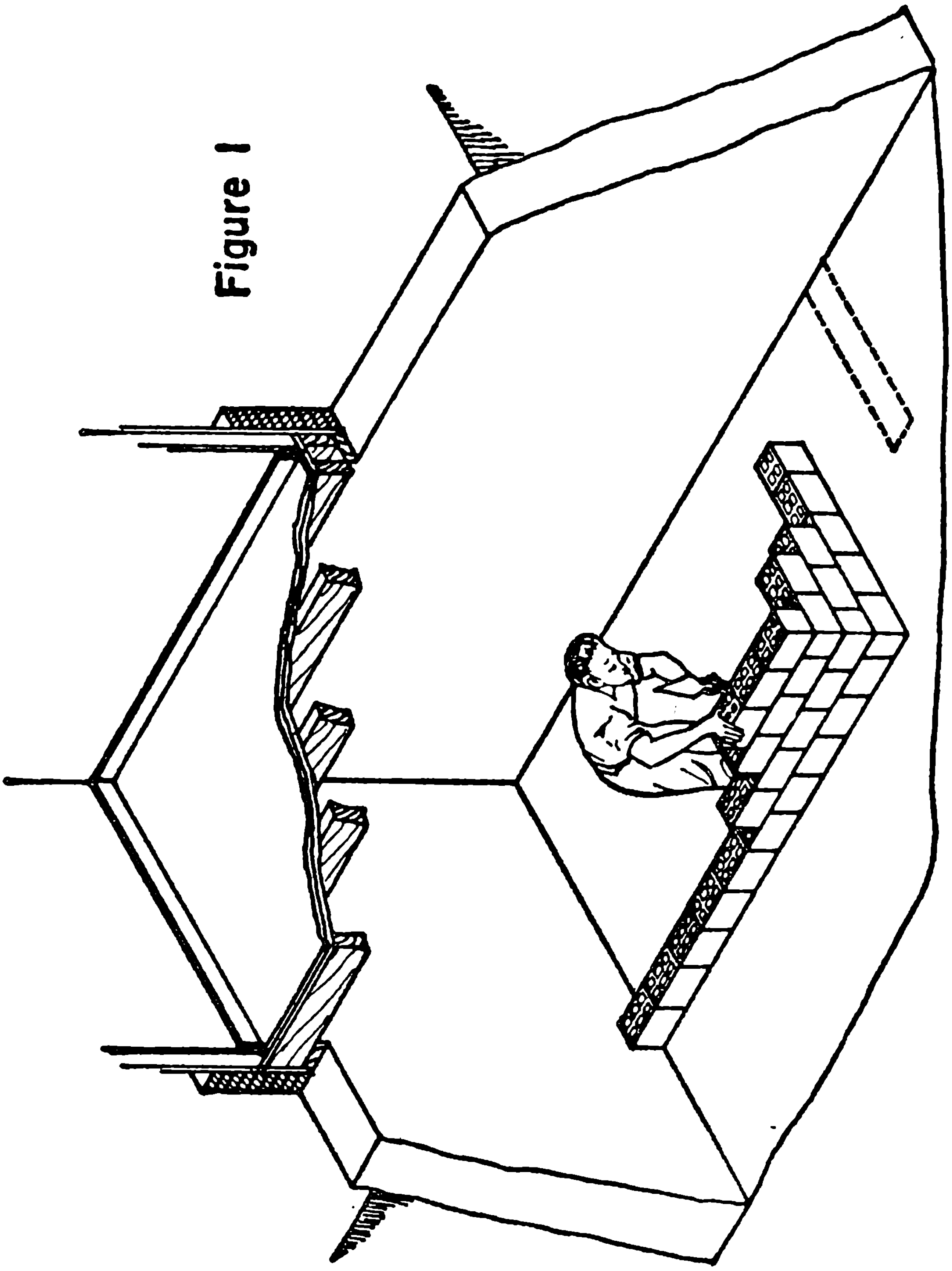
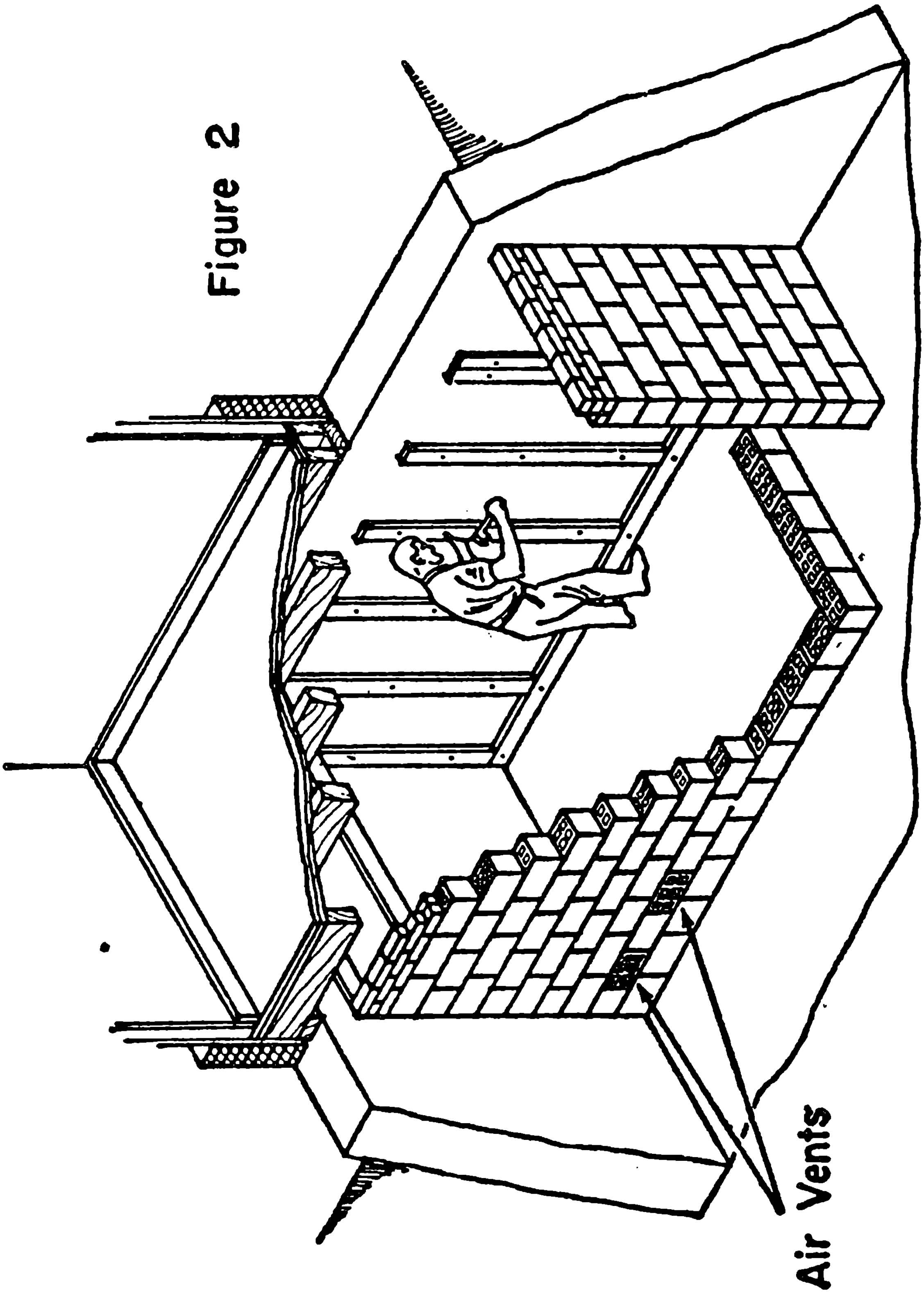


Figure 2



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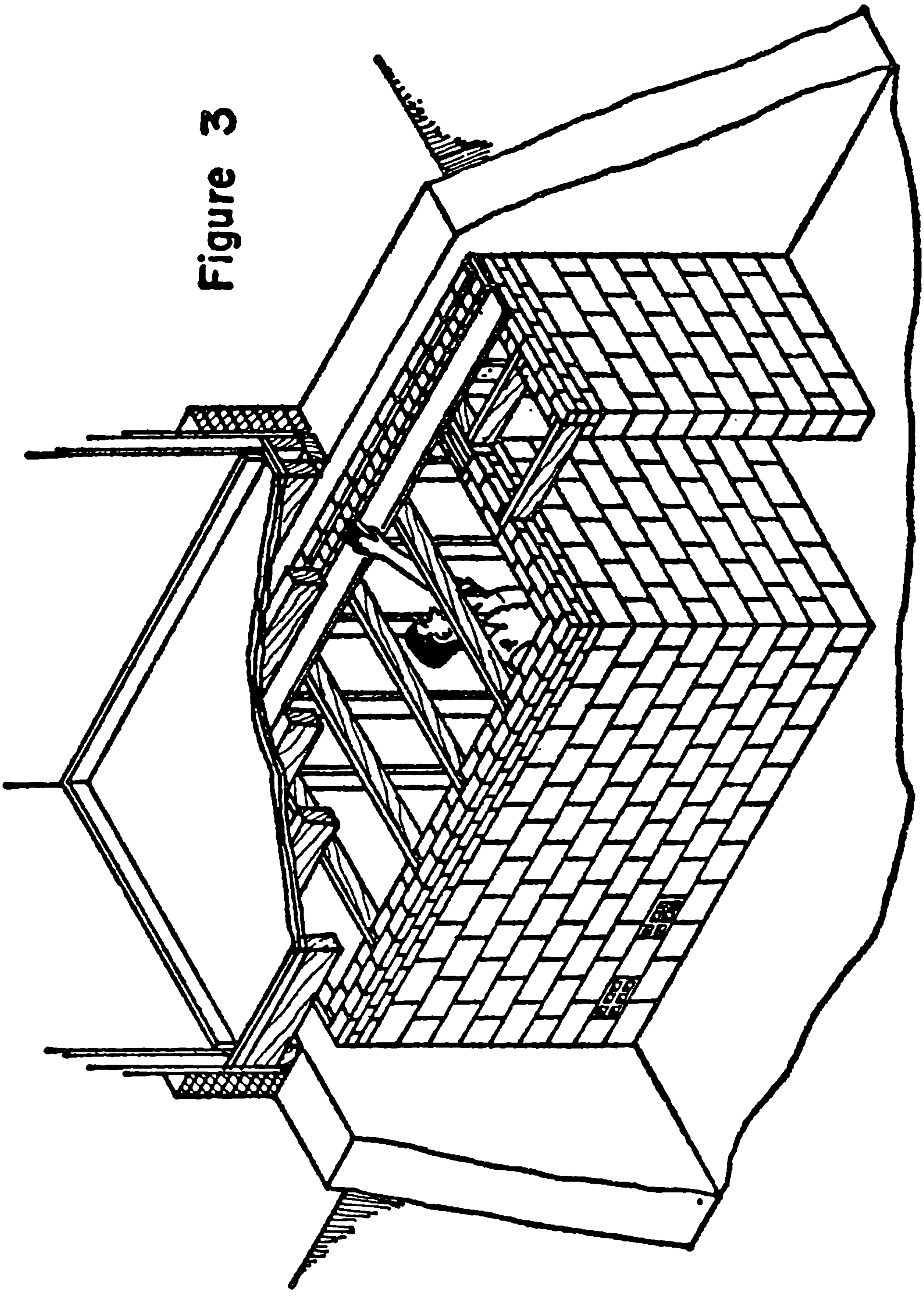

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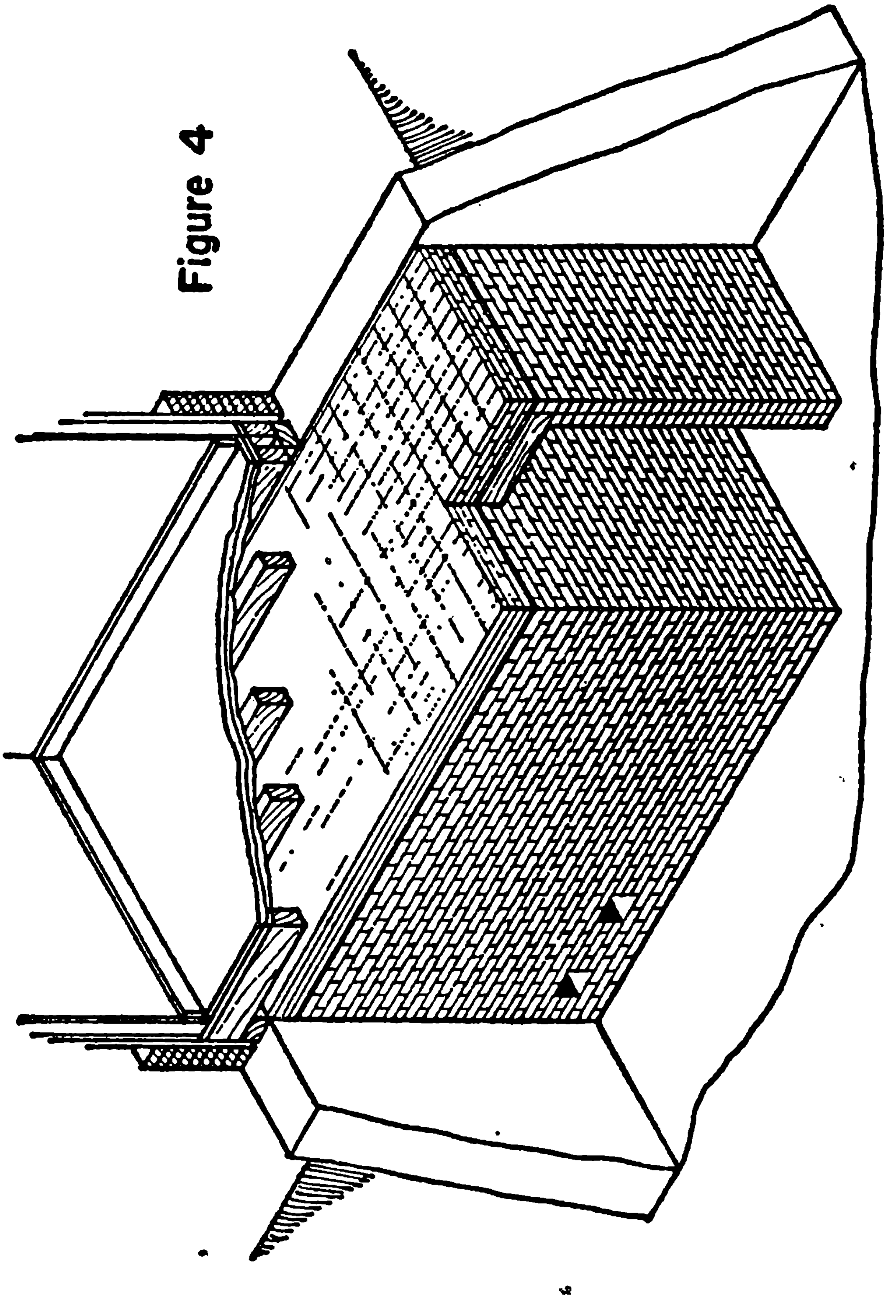

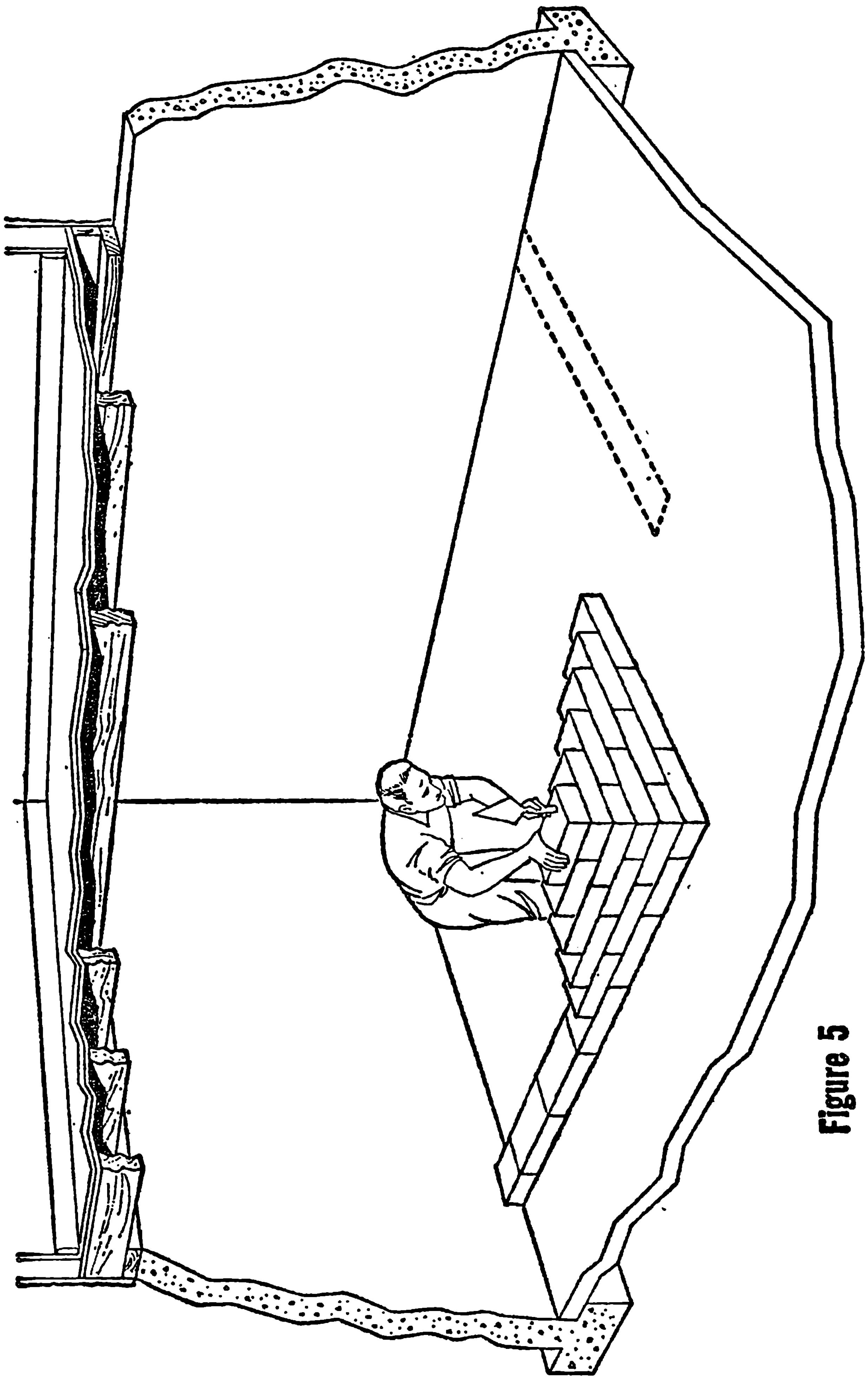

Figure 5

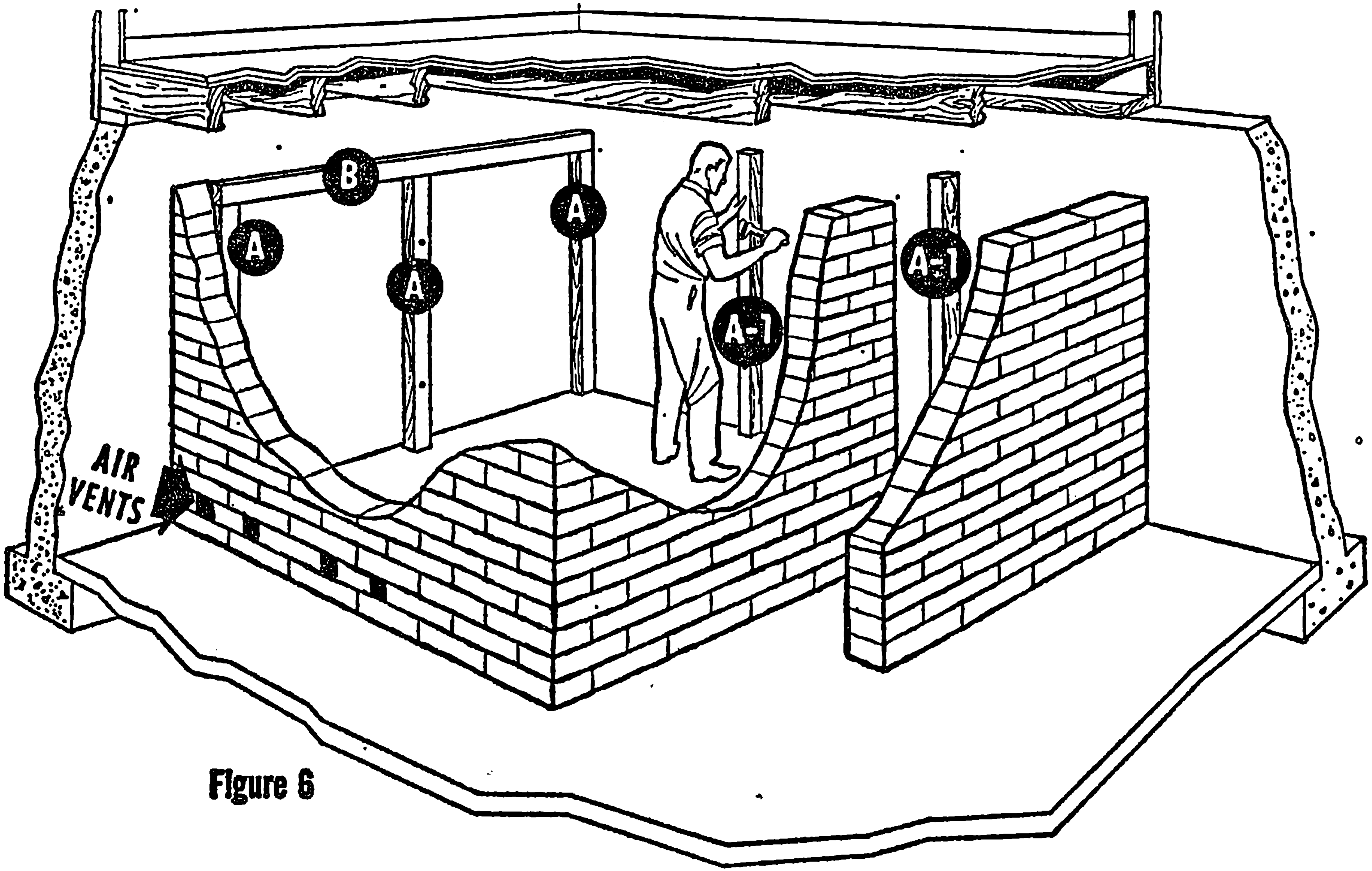
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Figure 6

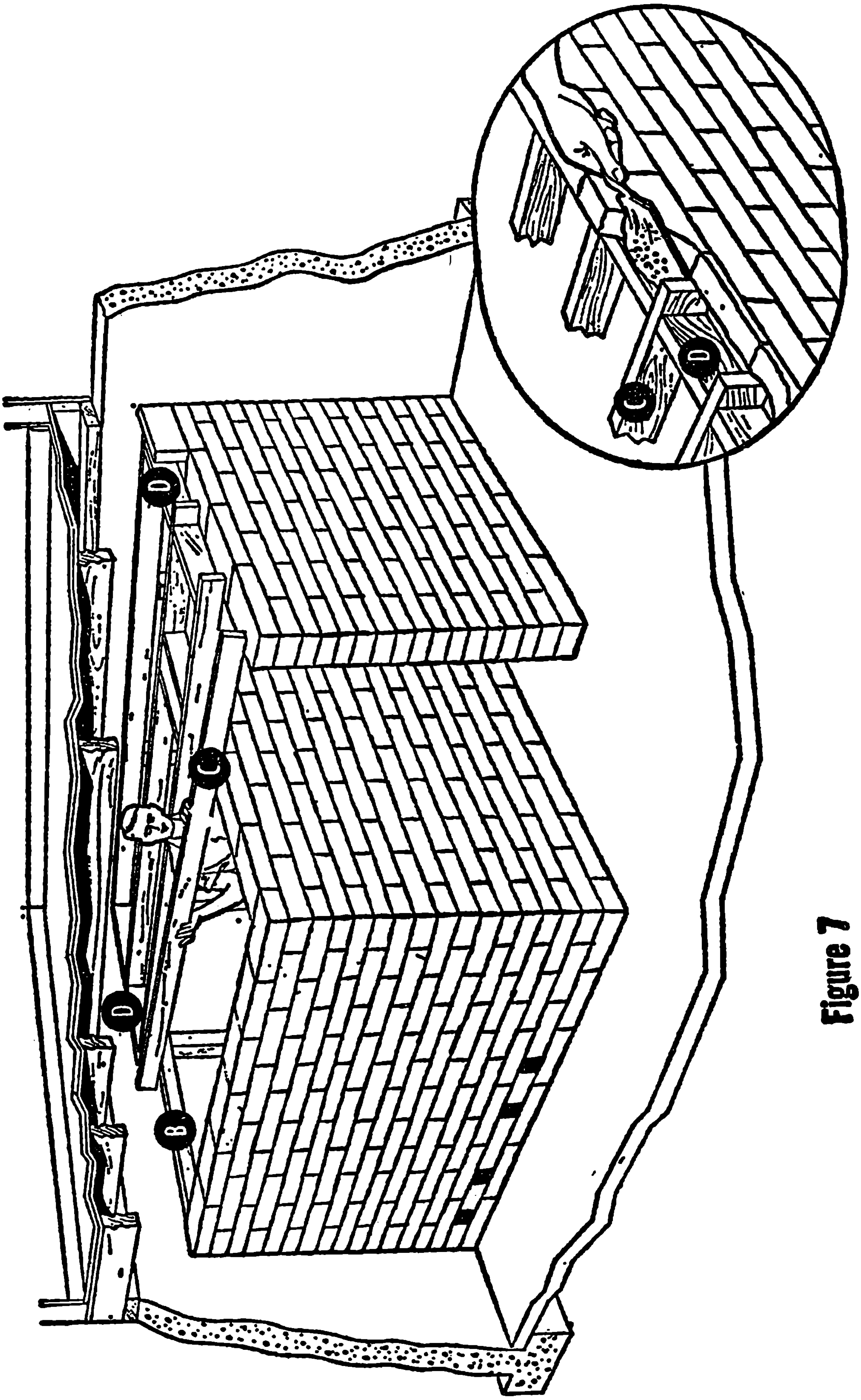


Figure 7

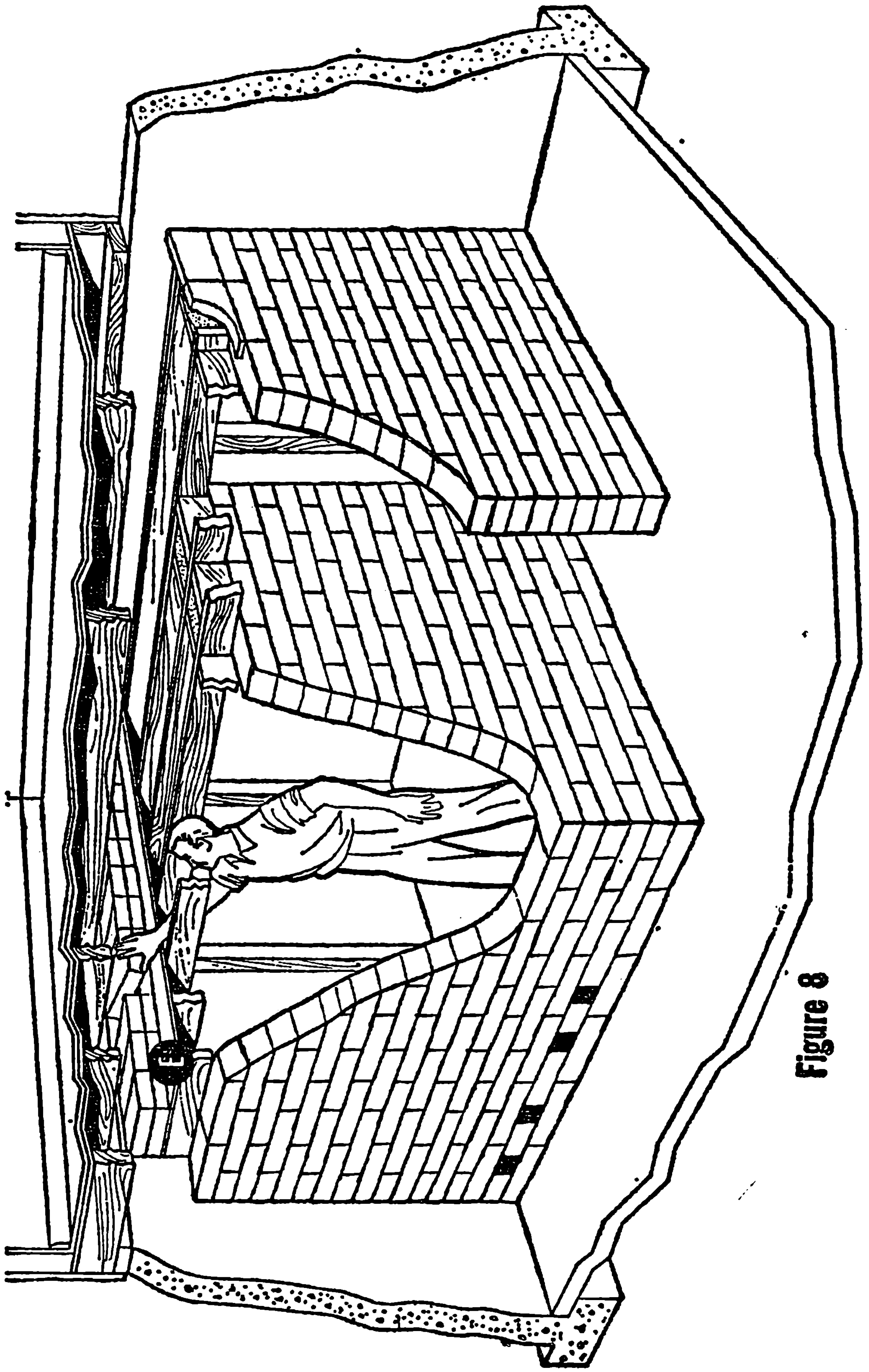


Figure 8

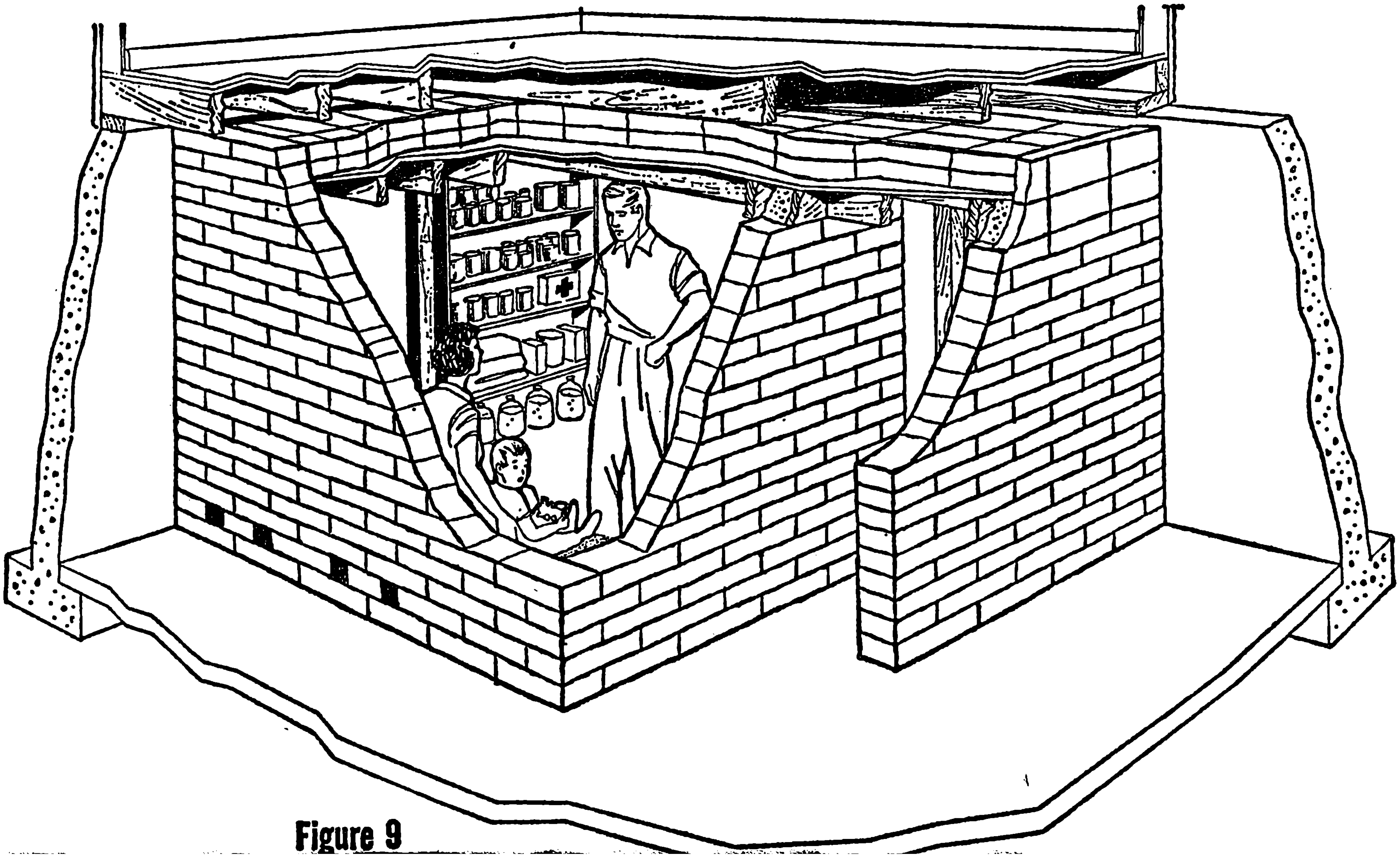


Figure 9

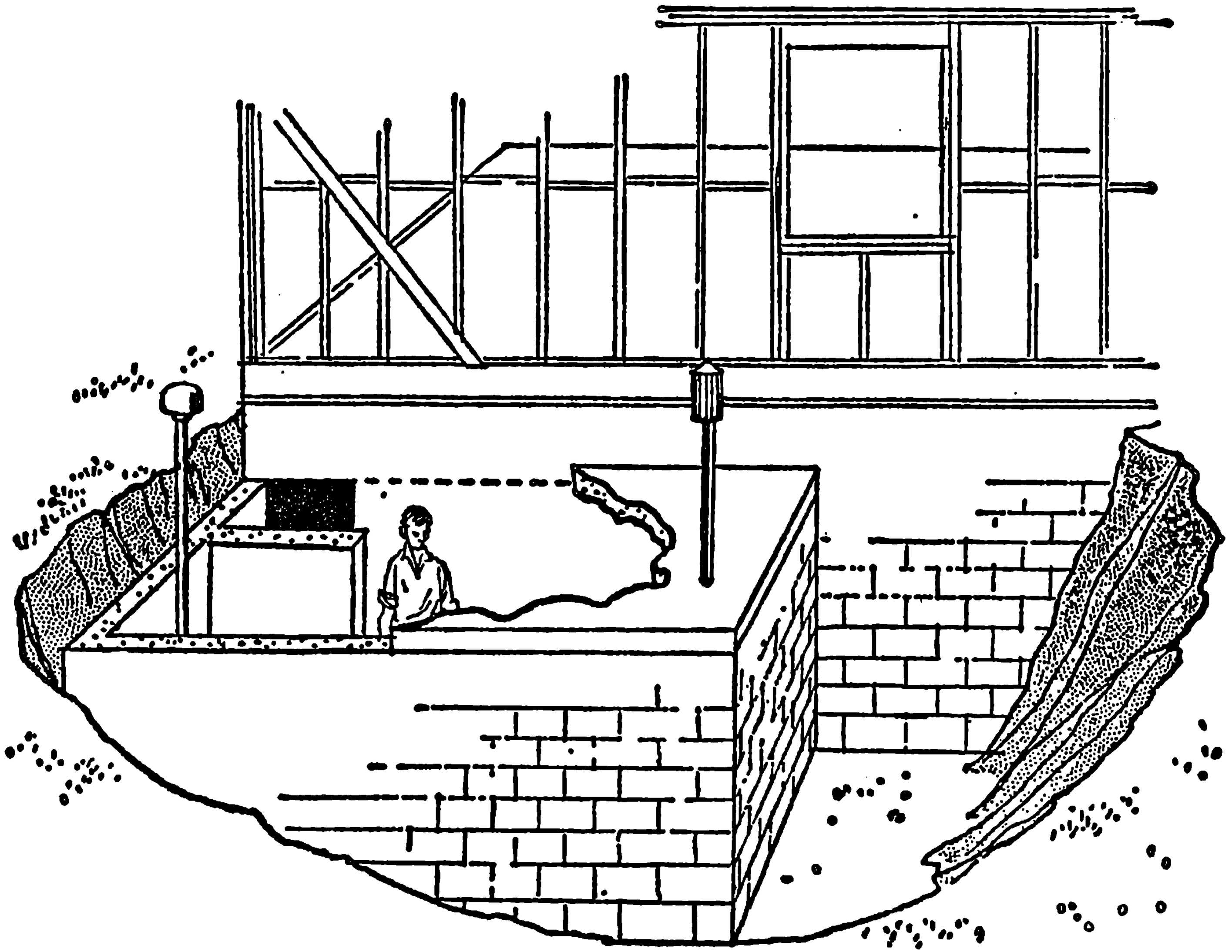


Figure 10—Basement shelter in new housing

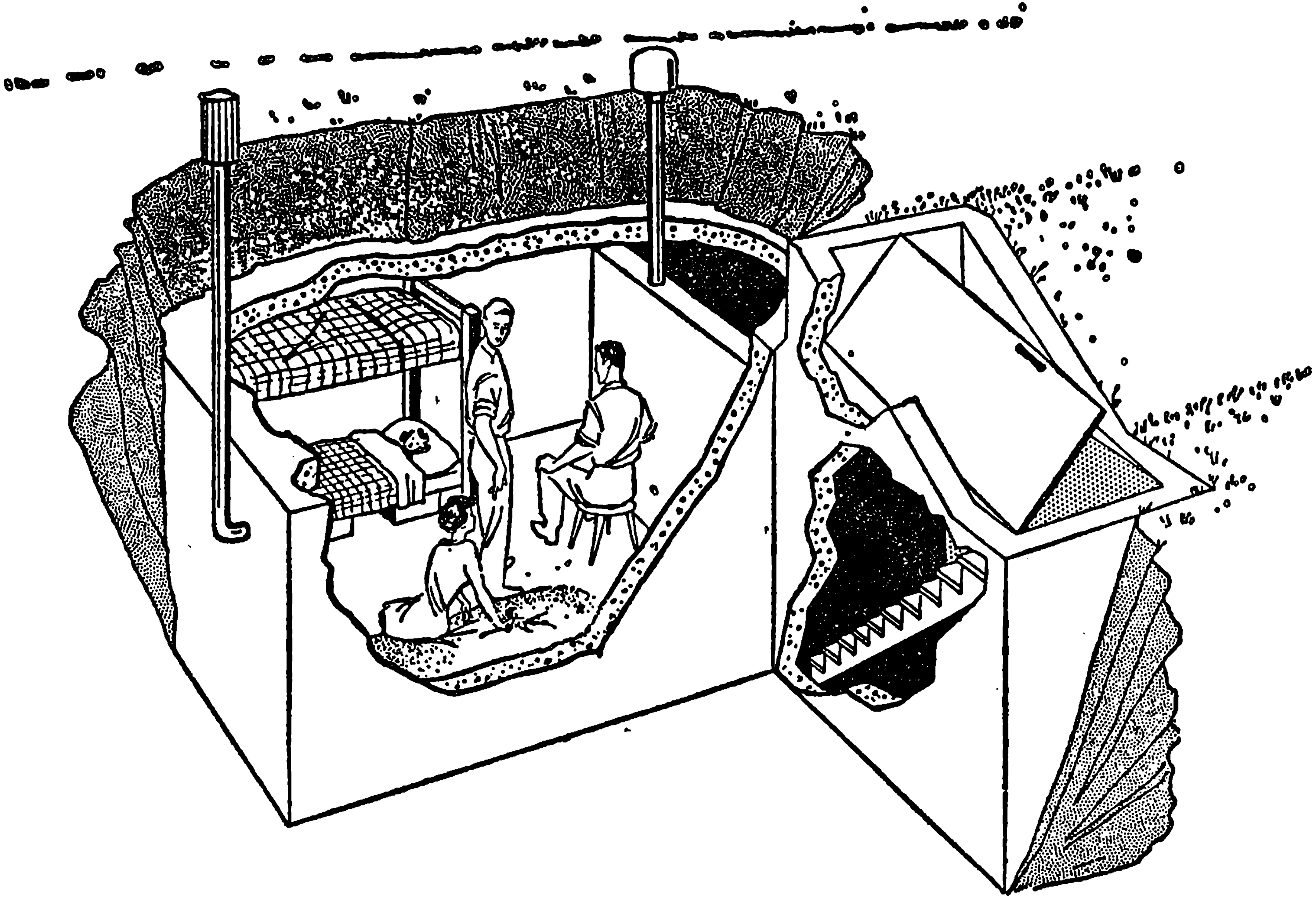


Figure 11—Underground concrete shelter

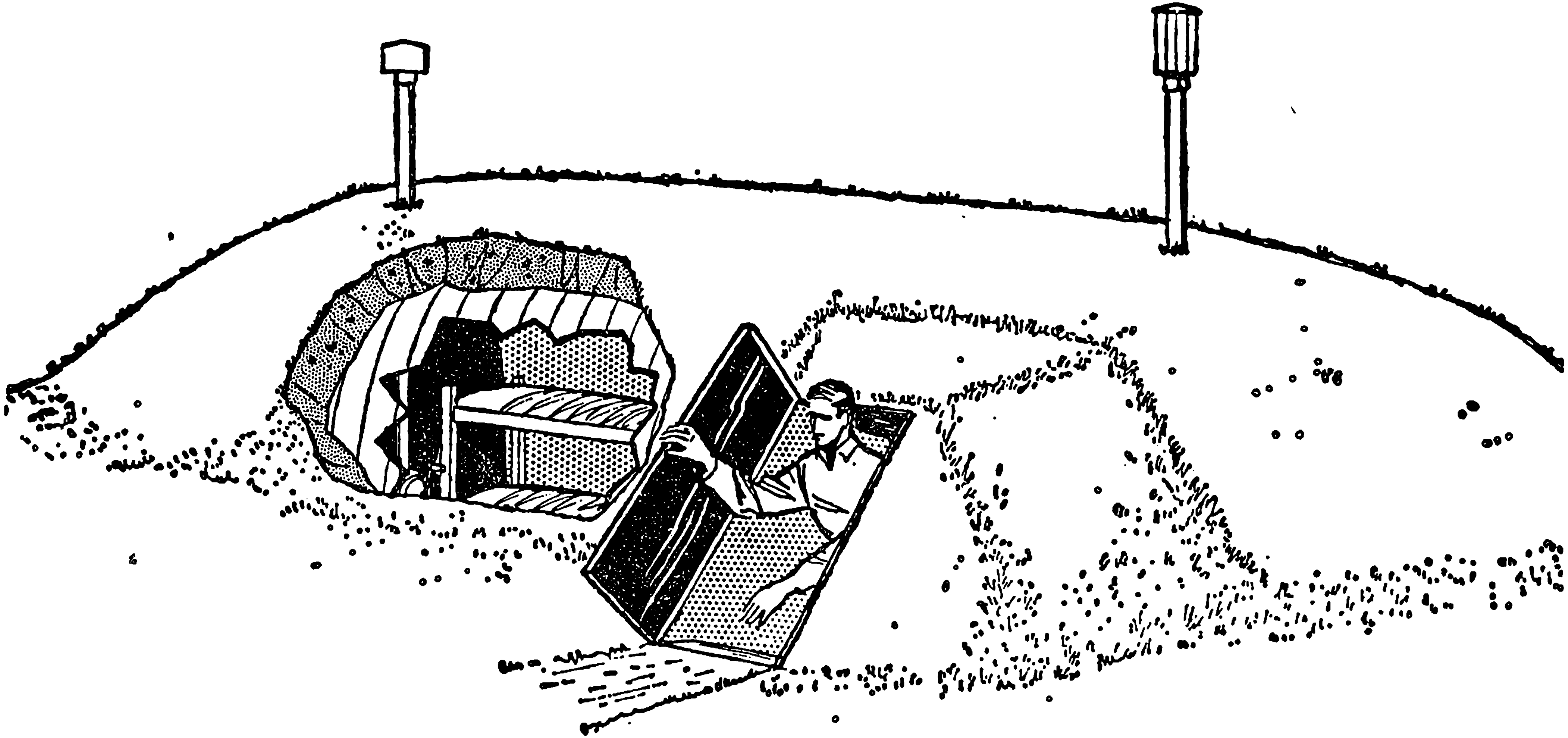


Figure 12—Pre-shaped metal shelter

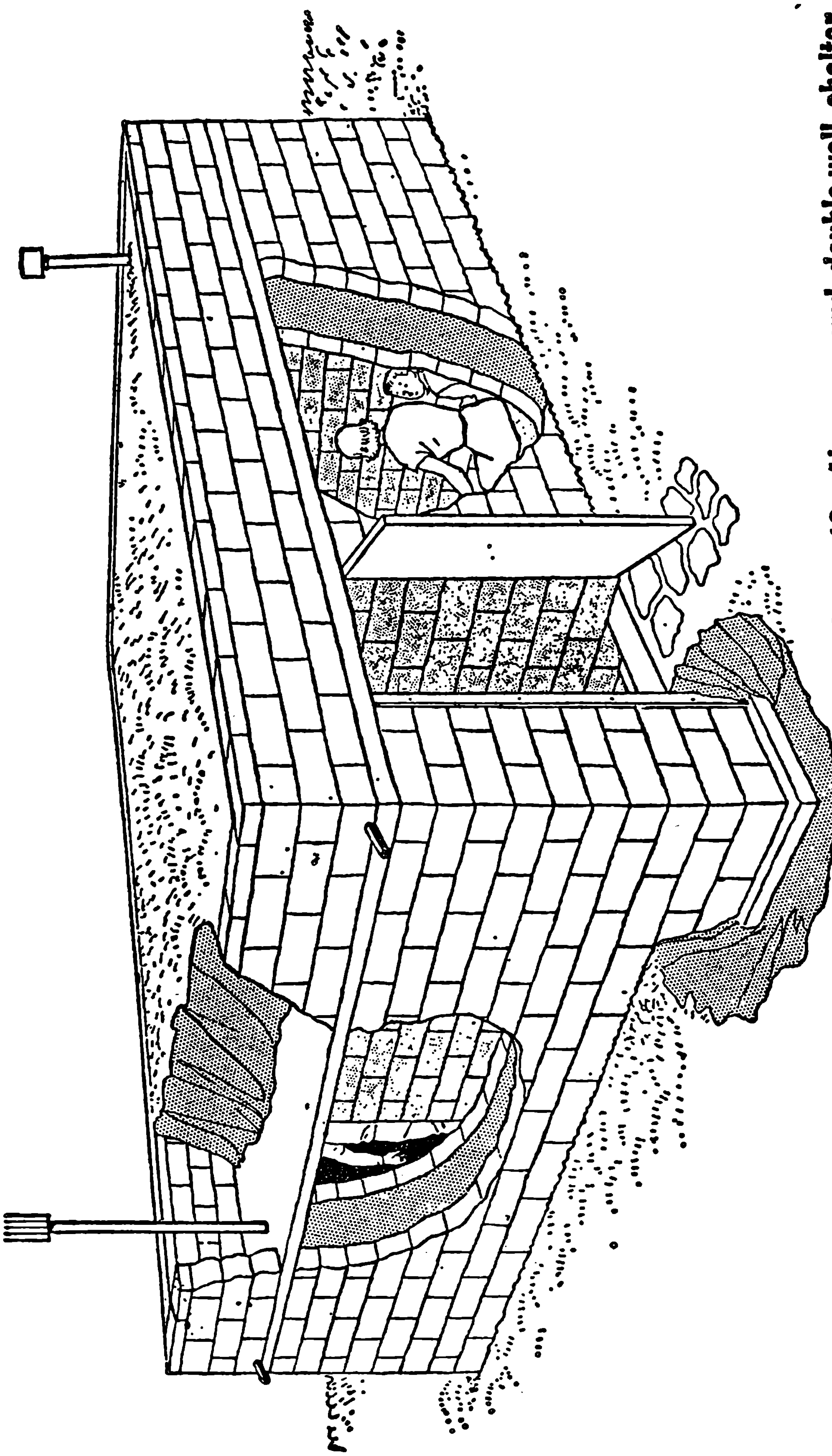


Figure 13—Above ground double-wall shelter

CHAPTER 10

DEFENSE AGAINST RADIOACTIVE FALLOUT ON THE FARM

The United States Department of Agriculture has issued a publication on this subject, prepared in cooperation with the Atomic Energy Commission, the Federal Civil Defense Administration, and the United States Public Health Service. It is a comprehensive work dealing with radioactive contamination conditions that may exist following the explosion of nuclear weapons during war.

This information is of particular importance, since in the event of nuclear attack, the American farmer would be counted on to supply the food and fiber needed to keep the economy going, and radioactive fallout is one of the problems the farmer might have to face.

The material contained in this chapter is taken directly from the Department of Agriculture bulletin and incorporates the recommendations of scientists, engineers, civil defense authorities and other specialists. You may not find here all the information you would like to have on protection against fallout, but you will have the best information available at the moment. Study of the effect of radioactive fallout in agriculture is a continuing project, and since some of the recommendations here may have to be changed from time to time in the light of future research, it would be advisable, if you are engaged in farming, for you to keep in close touch.with developments through your county agricultural agent, your Grange, or your nearest Civil Defense office.

In the event of enemy attack, first provide for your own safety, and that of your family and neighbors. To do this, you may initially have to ignore your livestock, your crops and your land. Your best protection against fallout is to remain indoors, preferably in a basement or çellar, and to avoid contact with contaminated objects. When in doubt, seek shelter. Follow all the instructions, practices, and procedures outlined in previous chapters of this *Family Survival Handbook.* Authorities will make every effort to let you know when it is safe to come out of shelter. Civil defense is for the American farmer, too. Avail yourself of its protection—now—and you may be gratified to learn that there is an important phase of CD in which you can take an active part.

Because of the presence in fallout of certain chemical components which have a direct affinity for the soil and thereby on the crops grown upon it, fallout has a significance to the farmer that goes somewhat beyond the prime hazard of radioactivity, because soil contamination can persist much longer than surface contamination, and in certain cases may require special methods of treatment for its early elimination.

So let us review the nature of fallout giving particular attention to its effect on the soil and on farming operations in general.

There *is* a defense against fallout—on the farm as in the home. The following questions and answers will help you to understand the nature of fallout, and, in the event of enemy attack, will help you protect yourself from it.

WHAT IS RADIOACTIVITY?

It is a process whereby certain elements disintegrate, and in so doing release one or more types of powerful rays.

Radioactivity is nothing new. All living things are constantly exposed to small amounts of radiation. Cosmic rays from space continually pass through our bodies. We breathe and eat radioactive materials that occur naturally in the soil, water, and air. We also are exposed to radiation when we have X-ray examinations. But explosions of nuclear bombs produce large amounts of radioactive elements that can affect the health of human beings and animals. NOTE: *In the case of United States nuclear tests, precautions are taken to protect the public against the hazard of fallout.*

WHAT HAPPENS WHEN A NUCLEAR BOMB EXPLODES?

The explosion of an atomic or hydrogen bomb is accompanied by *blast, heat, initial radiation,* and *residual radiation.* The first three occur almost instantaneously with the explosion, and are destructive at the target area and for some miles around. The fourth—residual radiation—has a delayed and longer effect, and may be dangerous over a considerably larger area.

WHAT IS FALLOUT?

Fallout is the term used to describe radioactive particles, produced by nuclear explosions, that fall to earth from the upper air. When the bomb explodes close to the earth, large quantities of soil, rock, and debris are drawn up into the ascending cloud. After mixing with the highly radioactive material, particles fall back to earth and produce radioactive contamination. Some of the particles fall close to the point of the explosion, while others may drift downwind for many miles before settling to earth.

A bomb exploded high in the air does not produce immediate serious fallout because there is no heavy debris taken up into the cloud to bring the radioactive material down to earth. The radioactive particles tend to remain suspended for days, months, or years in the upper atmosphere where most of the radioactivity is lost harmlessly before settling to earth.

WHY IS FALLOUT DANGEROUS?

If an area is highly contaminated by fallout, the radiation may be a threat to human beings, animals, and crops. Fallout can also contaminate food, water, buildings, yards, and fields, and make them unsafe to use for certain periods.

Some of the rays can penetrate the body and cause serious internal damage. Others, while not capable of deep penetration, can burn the skin. Some of the radioactive chemical elements in the fallout, such as radioactive strontium and radioactive iodine, can cause serious internal radiation damage if taken into the body in sufficiently large quantities.

To understand the nature of fallout, it is necessary to know that fallout particles contain a mixture of long-lived and short-lived materials, each of which decays at a specific rate. Scientists usually measure the decay rate by the half-life of the material. The half-life is the time required for one-half, or 50 percent, of a given amount of a specific material to decay. Radioactive strontium is among the most important of the long-lived group. Radioactive iodine is an example of an important relatively short-lived substance.

Chemically, radioactive strontium is similar to calcium. After it enters the body, it tends to collect in the bones. It has a half-life of about 28 years, and large amounts of it in the body can cause bone cancer, and can damage tissue.

Radioactive iodine has a half-life of about eight days, and therefore, is not dangerous for as long a time as radioactive strontium. After it enters the body, it tends to collect in the thyroid gland. If too much of it is present in the body, it may cause cancer of the thyroid gland and otherwise seriously damage the thyroid cells.

Small concentrations of radioactive strontium and radioactive iodine are not dangerous to most persons if exposure is not prolonged.

Fallout can be a serious hazard to communities that are miles beyond the areas affected by the explosion. During a 1954 test at the Eniwetok Proving Grounds in the Pacific, the area where fallout would have seriously threatened nearly all the lives of persons who took no protective measures extended about 140 miles downwind from the point of explosion, and was up to 20 miles in width.

WHAT DETERMINES THE SIZE OF THE FALLOUT AREA?

The extent and location of a fallout area are determined by:

1. Altitude of the bomb burst
2. Power and design of the bomb
3. Size of the fallout particles
4. Atmospheric conditions—air currents and the direction and speed of the winds, particularly those at 10,000 to 80,000 feet
5. Snow and rain
6. The nature of the ground surface

Because of the variety of factors, it is not possible to estimate accurately the fallout hazard in advance. However, the area of probable fallout and the speed with which fallout will arrive can be estimated. Such forecasts are to be released by the Weather Bureau and will be available to Civil Defense authorities.

After a bomb is exploded close to the ground, the large radioactive cloud rises to a high level in the atmosphere. The particles are acted upon by the wind. Some of the particles are carried upwind, downwind, and crosswind, in the area of the target. Others are carried long distances downwind. Strong winds may spread fallout over wide areas.

Raindrops and snowflakes passing through contaminated air collect fallout. Particles that would normally spread over wide areas during dry weather quickly come to earth.

Hills, valleys, and slopes probably have no great effect on the distribution of fallout, but large mountains and ridges receive a high concentration of fallout on the side facing the surface wind. Wherever possible, radiation intensity should be checked in the local areas.

HOW LONG IS FALLOUT DANGEROUS?

The greatest hazard exists during the early hours following the explosion, when the radiation is very intense. The hazard decreases with the passage of time because radioactive materials decay, and as they decay the intensity of radiation decreases.

The particles reaching the ground soon after the burst are highly radioactive, while those that remain in the air for longer periods lose much of their radioactivity by decay before they settle to earth. Twenty-four hours after an explosion the average per-hour rate of radiation can be dangerous if there is a heavy concentration of fallout. Long half-life radioactive substances, such as strontium 90, are referred to on page 200.

HOW CAN I PROTECT MY FAMILY AND MYSELF FROM RADIATION?

The effect of radiation is in proportion to the period of exposure. Limit your exposure to it.

You can limit exposure by staying in an adequate shelter, such as those already described in Chapter 8. Several feet of earth or concrete provide excellent shielding from radiation. The walls of an ordinary frame house give some protection.

You can also limit exposure by getting away from the source of radiation. Radiation is absorbed in the air, and is significantly reduced a few hundred feet from the source. (See "Fallout: More Pointers on Protection," page 207.)

HOW WILL I KNOW IF FALLOUT IS COMING?

In the event of an enemy attack, Civil Defense officials and other authorized personnel will issue instructions by all available means of communication. If the radio and TV stations you normally listen to go off the air, attempt to tune in another station. If you cannot receive another station, try to get 640 or 1240, the CONELRAD civil defense frequencies, on your radio dial. You may not be within the effective range of a CONELRAD station. In that event, follow whatever instructions you have received from your local, county, or state Civil Defense.

Later you will receive information based on the findings of aerial or ground monitors who will conduct surveys in the area involved. The monitors will measure the radiation from the fallout with suitable instruments to determine what further precautions, if any, should be taken.

Remember! Fallout is odorless and may be invisible. It can be measured only with proper instruments. However, after an atomic attack, dust clouds or unusual dust concentrations in the atmosphere should be assumed to be radioactive until they have been officially surveyed with instruments and found not to be radioactive.

FALLOUT DETECTORS

You would not find a Geiger counter useful because the instruments commonly available are designed for such use as uranium prospecting and are not satisfactory for measuring dangerous levels of fallout.

Even the proper instruments are of no value except when used by experienced persons who are qualified to interpret the readings.

FALLOUT: LIVESTOCK

How Will Fallout Affect Unprotected Livestock— That Is, Animals in Fields, Pastures, and Other Open Areas?

Fallout may be dangerous to cattle, sheep, horses, pigs, and other livestock as well as to human beings. Animals can suffer skin burns if fallout settles in the coat. If animals drink fallout in their water or eat it in pasture grass or commercial feed, the radiation may cause serious internal injuries. External radiation or surface contamination emits rays capable of penetrating deep into the body and may result in total body exposure.

If you receive ample warning that fallout is coming, you can take certain precautions to protect your livestock and reduce losses. But once fallout occurs, you should not attempt to protect livestock unless Civil Defense officials tell you that it is safe to do so.

How Will Fallout Affect Sheltered Livestock?

Livestock housed in barns and other farm buildings during fallout stand a better chance of surviving the effects of radiation than those that are not sheltered. A reasonably well-built shelter prevents fallout from settling on the animals' bodies and may reduce the intensity of external radiation. It also protects against the animals' eating contaminated food.

What Is the Best Way To Protect Livestock From Fallout?

Move them indoors as soon as possible, and keep them off contaminated feed and water. If you do not have adequate facilities to house livestock, put them near farm buildings, in a yard, or in a tree-sheltered field.

Get your dairy cattle under cover first. If they eat fallout, or drink it in water, some of the radioactive material will be in their manure and urine, and some will be in their milk.

What Water and Feed Can I Give Livestock After Fallout?

Caution: Do not allow your animals to go without water and feed too long. It is better to keep them alive on contaminated water and feed than to let them die of thirst and hunger.

Water and feed become contaminated if they are exposed to fallout. Water from a covered well, tank, or cistern, or from a freely running spring, should be safe. If possible, use water from a covered well.

Pond water is less safe, but, if necessary, it can be used a few days after fallout has occurred.

To prevent contamination from fallout, do not add water to tanks or cisterns, except water from a properly protected well or spring, until the water originally present is used.

Give your livestock feed that has not been exposed to fallout. If the particles settle on hay, silage, or a stack of feedbags, they will contaminate only the outer portions. You can remove the outer layers or bags, and use the inside feed that is unaffected. Do not handle contaminated feed until told by the Civil Defense authorities that it is safe to do so, and be sure to follow the precautions they may recommend.

Farmers will be notified if authorities measuring concentrations of fallout consider forage growing in an area to be harmful.

You may have to give cows contaminated feed if no other feed is available. Although the milk from these cows may not be usable for a brief period, once the cows are back on clean feed, the amount of radioactive materials in their milk will progressively diminish. Civil Defense authorities will measure fallout in affected areas and warn farmers when milk is unsafe.

What Can I Do With Contaminated Feed?

You may be able to feed it to livestock eventually. Because of radioactive decay, even dangerously contaminated feed may be safe to use after a period of storage. How long feed should be stored depends on such factors as the age, amount, and concentrations of the fission products. Area monitors will notify farmers of these factors through regular civil defense channels. Long half-life radioactive substances, such as strontium 90, are referred to on page 200.

Should Dairy Cows Receive Special Treatment?

Yes. Since radioactive materials can accumulate in milk, which will be a very critical product during an emergency, you should make a special effort to protect cows from fallout.

Give cows preferred shelter and clean feed and water. If you can, milk them before fallout occurs. You may not be able to do so for a day or two afterwards. Reduce amounts of water and concentrated feed, and, if practicable, put cows and calves together; the calves can suckle and reduce the discomfort of full udders.

What Measures Should Be Taken To Protect Poultry?

Measures for protecting poultry are the same as those recommended for other farm animals. Flocks housed in concrete buildings would be better protected from fallout than those housed in wooden buildings.

Radioactive materials might show up in the eggs if hens eat contaminated feed. But most of the radioactive strontium will collect in the shells; very little will collect in the yolk and in the white.

What Animal Food Products Are Safe To Market After Fallout?

You will receive specific instructions from the Civil Defense authorities based on the amount of fallout received. *Do not destroy any animal food products unless spoilage has made them inedible.* Contaminated food products may be safe for consumption if they can be stored for a period of time to allow the radioactivity to decay.

What Do I Do If Animals Die From Fallout?

Some of your animals may be affected so severely from fallout that they will die in a few days or weeks after being exposed. Others will be unthrifty; they may have to be slaughtered. (*Do not slaughter any of your livestock unless* *you are told to do so by Civil Defense or agricultural authorities.*)

If animals die from fallout, you can dispose of the bodies by burial. These carcasses usually are not dangerous to surviving animals. Special instructions for your protection while handling contaminated carcasses may be issued by Civil Defense authorities at the time, depending on the amount of contamination present.

Is It Possible To Decontaminate Livestock and Farm Buildings That Have Been Exposed To Fallout?

If there is fallout on the animals' skins, much of the radioactivity can be washed off. Civil Defense authorities may advise you to hose down animals and to clean stables, barns, and other farm buildings. They will also tell you when it is safe to do these things. In handling animals, take proper precautions to prevent contaminating yourself. Cleaning or disinfecting buildings will not destroy radioactivity.

Caution: Before hosing down animals or cleaning buildings, a thorough check should be made of possible radiation hazards.

FALLOUT:
LAND AND CROPS

How Long Would Fallout Affect Cultivated and Noncultivated Lands?

It would depend on the abundance and type of radioactive materials in a given area.

Short- and medium-lived materials would decay rapidly; the principal danger from them would be external radiation. Although the hazard may be reduced in days or weeks after fallout, contamination should be checked by radiological monitoring.

Radioactive strontium—a long-lived material—could affect soils and plants for decades. Since it is chemically similar to calcium, it would be absorbed by plants that require cal-

cium. Plants growing in soils deficient in calcium would absorb more radioactive strontium than those growing in soils abundant in calcium, other conditions being equal.

Cultivated land probably would remain hazardous a shorter time than range land. Cultivation would cover most of the radioactive particles. Also, run-off of surface water is greater on cultivated land and therefore some radioactive particles would be carried away.

Are There Treatments For Reducing the Fallout Hazard on Land?

Yes. You can treat lands to reduce the fallout hazard after external radiation levels are low enough to go outdoors and work. One possible treatment is to leach porous soils with water. Other treatments include: Intensive liming of strongly acid and moderately acid soils, adding large amounts of decomposable organic matter to the soil, and plowing deep the surface layer of the soil. *Note*: Selection of the proper treatment requires the advice of a soil scientist.

It probably would be uneconomical to decontaminate range lands.

Would Fallout Permanently Affect Pasture Grass?

A heavy deposit of fallout would spread short-lived and long-lived radioactive particles on the pasture. The existing growth would be affected by particles that have fallen on the exposed portions of the plants; succeeding growths, following grazing or mowing, would be affected internally from the long-lived radioactive materials absorbed from the soil by the roots. There probably would be no visible injury to the plants from the radiation.

Could I Ever Use Contaminated Pasture Grass?

If fallout is light, the pasture might be usable immediately.

If fallout is heavy on soils that have a low available calcium level, it is advisable to plow soil deep, lime, and replant; on soils that have a high available calcium level, mow and discard existing growth. Another alternative is to allow livestock to graze on contaminated pasture, and use meat and milk under the supervision of the radiological defense supervisor. This may be the only available course during an emergency in order to keep the livestock alive. *Note*: Determining the best course requires the advice of a soil scientist.

Once it is safe to work the land, a periodic check on pasture and produce in affected areas will provide the best guide as to their use.

Will Fallout Affect My System of Farming?

It could. If your land is seriously contaminated, it may be necessary to change to nonfood crops or to food crops that do not absorb large amounts of fallout from the soil. Alfalfa, clover, soybeans, and leafy vegetables would have a tendency to absorb long-lived radioactive strontium, while cereal grains, potatoes, and fruits would not.

Would Fallout Reduce the Economic Productivity of Crop and Pasture Lands?

Yes, it might reduce such productivity in several ways: (1) crop and soil management would be impeded because of the danger of external radiation; (2) crops would become contaminated and unmarketable; and (3) some lower-yielding crops that do not absorb large quantities of fallout would be substituted for higher-yielding crops that do.

When Could I Use Water in an Exposed Field?

Water in an exposed field would be contaminated; the hazard in using it would depend on the concentration of fallout.

Usually, there would be a prompt diffusion of the radioactive materials in the water, reducing the contamination at the surface. If the water were being constantly replenished from an uncontaminated source, radioactivity would be diluted rapidly.

What Are the Effects of Fallout On Growing Vegetables?

Growing vegetables that are exposed to heavy fallout may become highly radioactive. Leaves, pods, and fruits are immediately contaminated upon contact with the radioactive particles. Roots and tubers are affected only if they absorb long-lived material, such as radioactive strontium, from the soil. Underground vegetables may become affected if they touch contaminated surface soil during harvest. *Most vegetables would be marketable, and should not be destroyed without testing for radioactivity.*

What Are the Effects of Fallout on Growing Fruit, Including Green Fruit and Ripe Fruit?

If fallout is heavy, ripe, thin-skinned fruits may be lost because of the personal hazard involved in harvesting them. Thick-skinned fruits that do not have to be picked immediately and are peeled before eating can be saved. They can be decontaminated with washing agents before marketing. Orchard trees should be maintained, and the fruits examined for radioactivity before and after harvest.

What Effect Would Fallout Have on Alfalfa and Other Feed Crops?

Existing growths of alfalfa and other feed crops might not be usable because of radiation hazard. Radioactivity would be less in subsequent growths. What you should do depends on the calcium level of your soil. *Acid soils that have a low available calcium level:* A new planting should be made after the original planting is plowed deep, and lime is applied. *Soils that have a high available calcium level:* If a radiation survey indicates that the concentration level is high enough to require it, the existing growth should be mowed and discarded, and only succeeding growths used.

Would Fallout Limit the Use of Plants For Human Food?

It depends on the extent of the radioactivity.

Leafy vegetables, such as lettuce, should not be eaten unless they are thoroughly washed, and are known to be free of hazardous amounts of radioactivity.

What Special Precautions Should be Taken For Workers In the Fields?

Everyone should remain indoors until the danger from fallout has diminished. When you are advised by Civil Defense officials that it is safe to work outdoors, you may be asked to take certain precautions, such as wearing boots, coat, hat, and gloves. If you work with livestock, touch them as little as possible; fallout may be on their backs.

MORE POINTERS ON PROTECTION

What you can do now:

Determine what shelter area will best protect your family and yourself.

Learn official civil defense action signals, and what to do when you hear them.

Prepare your home: (a) Obtain a civil defense disaster first-aid kit; (b) Learn how to use it; (c) Practice a fire-safe housekeeping; (d) Learn to fight small fires; (e) Maintain a seven-day emergency supply of food and water at all times, and store it in the basement; (f) Equip the most protected place you can find in or near your home for a shelter; (g) Make a list of the things you would need during a stay of several days in the shelter; place as many of these as possible in the shelter; (h) Know how to practice emergency sanitation measures if necessary.

Memorize the CONELRAD frequencies of 640 and 1240 on the AM radio dial. (See pp. 49 to 53). These are the stations that will carry official information and instructions in an emergency. If possible, obtain a battery radio; the explosion may cause a power breakdown.

Plan an emergency water supply and a sewage disposal method for your home shelter area that do not depend on outside electric power. Remember, a spring or deep well may be useless if the pump depends on public power supplies.

If You Have a Few Hours Warning:

Make arrangements for the safety of your family and yourself. Have about a two-weeks' supply of food in the house.

Bring feed into buildings, or cover it with a tarpaulin if it is left outdoors.

Store as much water as possible for livestock, especially if the water is coming from ponds or streams or through water mains. Cover wells and rainbarrels.

Move farm machinery and equipment indoors or store them near the farm house and keep them covered.

If You Have a Few Months warning:

If the Government is able to give the public a few months warning that an atomic attack is likely, here are some things that you can do:

Put your silage pits and hay stacks near buildings and cover them with tarpaulins.

Keep your well clean and covered. Put some rainwater barrels and other containers near buildings; fill them regularly with clean water and keep them covered.

Store seed and grain in weather-proof buildings.

Stock up on packaged, canned, and bottled foods.

Have a satisfactory storage space for fuel.

During And After Fallout:

Remain indoors until you are told by Civil Defense authorities that the danger from fallout is over.

Wash hands and face and change clothing immediately if you have been exposed to high concentrations of fallout.

Used packaged, canned, and bottled foods, as well as food protected by storage and refrigeration; they are least likely to be contaminated. If it becomes necessary to use other foods, the following information should be helpful:

Milk—Safe to use if cows have not been exposed to fallout. May be safe to use if cows have been exposed to fallout but are being fed uncontaminated feed.

Eggs—Safe to use even if poultry have been exposed to small amounts of fallout.

Potatoes and Root Crops—Safe to use if they are washed and peeled.

Green Vegetables—Choose garden vegetables with solid hearts; cabbage, lettuce, etc. Before eating, remove several layers of the outer leaves, and wash the hearts thoroughly. Wear rubber gloves when removing the outer leaves.

Peas and Beans—Only the pods would be contaminated; the peas and beans are safe to use. Wear rubber gloves when removing the pods.

Wash hands thoroughly before eating.

Wear protective clothing—hat, coat, boots, gloves, etc.—the first few days you work outdoors. If you are plowing or cultivating dry land, or if you are harvesting corn, wear a dust filter over your nose and mouth; even a handkerchief will be of some value.

CHAPTER 11

BIOLOGICAL WARFARE AND THE FARMER

PROGRAM FOR THE DEFENSE OF ANIMALS

Biological warfare is a real threat to the livestock industry of this country. The public health, welfare, and national economy are affected by livestock diseases. A determined enemy might consider this industry a very profitable target.

Epizootics in animals occur more readily than epidemics in man. Man's control over domestic animals and their isolation has produced whole populations that are highly susceptible to many plagues.

The Hazard

Many pathogens are easily transmitted from one animal to another or from herd to herd by direct contact. Animal diseases can be introduced and spread by contaminated animal feeds, bedding, veterinary biologics, uncooked garbage, drinking water or streams, or man's wearing apparel. Livestock marketing practices with modern transportation to and from stockyards, livestock markets, sales barns, and hatcheries help spread disease over wide areas. Smuggling of animals and birds can bring in new or additional diseases. Intercontinental air transport provides a potential means of accidentally introducing infectious agents and insect vectors. Any or all of these means of spreading disease may be used by an enemy to deliberately introduce and spread BW agents among our livestock. Any enemy may also introduce and spread diseases to range cattle and farm animals by using wild animals and rodents.

There are many target populations among animals, each having peculiar living habits, and groups of diseases which might be directed against them. The various animal infections that might serve as BW agents include diseases not found in this country, and to which our animals have no immunity. The diseases most often mentioned are foot-and-mouth disease, rinderpest, Rift Valley fever, Teschen disease of swine, hog cholera caused by variants, fowl plague, and the highly fatal types of Newcastle disease. Common infections such as anthrax, brucellosis, tuberculosis, hog cholera, vesicular exanthema, vesicular stomatitis, pullorum disease, fowl paralysis, and the upper respiratory infections of chickens, pigs, and cattle should not be overlooked as they might cause an enormous amount of damage if permitted to spread unchecked.

The deliberate introduction of foreign animal diseases, or the intentional dissemination of certain infections already common to this country can cause many problems. The success of such action would depend upon establishing widely scattered outbreaks. An enemy can select the animal host, disease, time, and place. If centers of infections are started simultaneously and uncontrolled, they could produce serious outbreaks with significant losses of meat and other animal products.

By using several agents of similar diseases and employing them simultaneously an enemy might confuse and delay diagnosis. Such problems would appear if the various types of foot-and-mouth virus were disseminated in this manner. The problems would be further complicated because a vaccine effective against one type of foot-and-mouth virus is ineffective against another. An enemy might also combine disease agents of different types to produce symptoms unlike those usually associated with a single disease. Such combinations might produce more than one disease in the host with contradictory symptoms, and varying incubation periods.

Combinations might also act synergistically to make one of these more effective.

Unfortunately, there are a number of animal diseases both native and foreign, benign and highly fatal, that present similar symptoms. The vesicular diseases (foot-and-mouth, vesicular stomatitis, vesicular exanthema) illustrate this problem. To differentiate between these diseases by means of clinical symptoms is also impossible, even for experts. There are other groups of animal diseases that provide similar diagnostic problems.

Man as well as nature is capable of altering the characteristics of a microorganism. Such changes might result in the selection of mutants or variants of endemic or foreign pathogens with increased resistance to their physical, biological, and chemical environment. The possibility of hybridization within the disease field should not be overlooked.

While BW agents against animals could probably be spread successfully from aircraft, it is more likely that sabotage methods would be used and with little chance of detection.

General Countermeasures

Defense of animals against BW is not something new and startling. It requires only an extension of the principles and measures normally used in preventive medicine and disease control. Swift and effective action is necessary to keep damage and loss from BW attacks to a minimum.

The traditional approach of this country in dealing with foreign animal diseases is to attempt to prevent them from entering. The success of this effort depends a great deal on the import restrictions and strict quarantine measures at our borders and ports. Quarantine alone is effective only for a relatively short period of time. The carrier state or atypical case defeats this barrier. Thus, when this obstacle has been passed, its effect upon the livestock population of this country will be determined by the action taken by the federal and state disease control services.

The overall philosophy in this country is to eradicate animal diseases whenever possible rather than live with them. It is essential that this philosophy be emphasized at this time. Basically, the protection of our animal population calls for an effective organization for communicable disease control. The United States is fortunate to have well-organized and experienced cooperating disease control agencies: (1) The USDA, BAI, which deals with national, international, and interstate problems and cooperates with the states in disease control programs; and (2) the livestock sanitary authorities in each state. This combination of federal, and state disease control organizations extends into every livestock community of the country. Their regular programs concern the control and eradication of tuberculosis, brucellosis, cattle tick fever, and hog cholera. They must also be alert for any foreign animal diseases or unusual spread of domestic disease. Outbreaks of foreign or unusual diseases, although quite infrequent in this country, have proven the value of this watchfulness. An effective plan for detecting and reporting unusual diseases and conditions requires local veterinarians to report to the state veterinarian or to the BAI officials, who in turn conduct the necessary investigations to reach specific diagnosis, establish quarantines, and start appropriate control measures.

If diseases of vesicular character such as foot-and-mouth disease or vesicular stomatitis are suspected, state and federal BAI officials should make immediate arrangements for assistance from the specially trained federal BAI diagnosticians. The diagnostic specialists will conduct the necessary investigations to establish the diagnosis. State livestock sanitary authorities will instigate necessary quarantines. Appropriate control or eradication measures will be put in force by federal and state officials. Under certain conditions officials may seek assistance from the veterinary specialists of veterinary colleges and agricultural experiment stations, research institutes, state diagnostic laboratories, and some of the commercial laboratories. In some instances, disease specialists dispatched by the federal BAI may take necessary action for the control or eradication of an outbreak. Efforts will be made to conduct the diagnostic tests on the infected premises to aid in minimizing the possibility of further spread.

Poultry disease diagnosticians located in many poultry laboratories of the country should be called upon for help by federal and state officials.

Following each outbreak of an unusual nature epizootiological investigations should be initiated to determine the source of infection, method of spread, and probable extent of the outbreak.

Specific Countermeasures

Integrated BW defense planning should extend from the state to the regional, county, and local veterinary organizations. Such plans should include the federal BAI, state livestock sanitary authorities, meat and food inspection agencies, the extension services, the veterinary medical schools and veterinary science departments of universities and colleges, the State diagnostic laboratories, and the experiment stations. Results will depend, however, upon every veterinarian in the state, fully and promptly assuming his obligations and responsibilities in the civil defense program.

Prevention and Control

Fundamental factors in preventing and controlling communicable animal diseases are:

(a) Prompt detection and reporting
(b) Ability to recognize the disease (diagnosis)
(c) Establishing the means of spread (epidemiology)
(d) Elimination of the infectious agent from the environment
(e) Development of resistance in the host (immunization)

(f) Segregation or isolation of the infection from the susceptible host (quarantine and isolation)
(g) Application of effective treatment or cure

Prevention is the ideal means of combating disease. It is not a dramatic procedure and is extremely difficult to establish in both the human and animal health fields. Success in disease prevention requires the efforts of the individual and his community. Effective preventive medicine procedures must minimize the opportunities for diseases to spread from host to host. Good sanitary environment is essential, including safe water and feed, insect control, and preventing contacts between infected and susceptible hosts. Increasing the resistance of the animal population is important whether it be by specific therapy or otherwise.

The application of the principles of epidemiology is useful in controlling animal diseases. This was demonstrated in the first stages of the anthrax outbreak in Ohio in 1952—and in the outbreak of vesicular exanthema. Investigations revealed the factors involved in the introduction and spread of these diseases. From these studies it was possible to warn against and predict new outbreaks, and provide effective means of control.

To aid in disease prevention it would be highly desirable for the federal and state animal disease control officials to establish a cooperative program requiring information from each biological production and distribution agency relative to products sold within the respective states, and capable of initiating foci of infection and those antigens used for disease control or eradication programs.

Animal feeds, such as supplemental feeds with animal protein and bonemeal contents, can spread animal diseases unless very carefully processed and handled to assure a safe product. Malignant edema, anthrax, and black leg may be spread this way. Chemical poisonings from this source should not be overlooked.

The USDA has amended the regulations governing the sanitary control of animal byproducts offered for entry into the United States, to permit only steamed or special steamed (degelatinized) bonemeal to enter the country. Such processing destroys anthrax spores. All imported animal bones including those to be used for fertilizer as well as those for animal feed will have to be further processed in establishments approved by the USDA. This will aid in preventing the introduction of anthrax and other animal diseases from foreign countries.

The careless and unsanitary practices that have existed in many unsupervised rendering plants provide many opportunities for the spread of animal diseases. The unusual outbreak of anthrax in the midwest during the spring of 1952, involving contaminated bonemeal and meat scrap used in animal feeds, stimulated some states to adopt more effective laws regulating the operation of local rendering plants.

The feeding of raw garbage presents an ever present danger of introducing and spreading disease. Raw garbage has been almost solely responsible for spreading the current widespread vesicular exanthema outbreak among swine. The 1924 and 1929 outbreaks of foot-and-mouth disease in this country started from raw garbage. Hog cholera, trichinosis, and other diseases and parasites of swine also can be spread by raw garbage.

Most state governments have enacted necessary legislation requiring the thorough cooking of garbage before it is fed to swine and controlling the intrastate movement of garbage-fed swine. The federal government, in addition to establishing quarantines in states and areas in which swine are infected with vesicular exanthema, is restricting the interstate movement of infected or exposed swine and their products. These regulatory measures will aid materially in controlling vesicular exanthema and other diseases that are transmitted through the feeding of raw garbage.

Transportation presents a potential means of disease spread. All conveyances should be cleaned and disinfected following each movement of livestock and poultry. As a part of the cooperative vesicular exanthema control program, new federal regulations require that all vehicles hauling swine interstate a distance of 200 miles or more, whether or not from a quarantine area, must be cleaned and disinfected after each such use. All premises and facilities used for hogs in interstate commerce must be cleaned and disinfected after each use by swine.

Conditions and practices found in some sales barns, among some livestock dealers, and even in some stock yards, provide opportunities for the introduction and spread of animal diseases. Livestock markets dealing in the transfer of livestock should employ regular cleaning and disinfecting practices following each day's sales.

The success of a disease control program depends upon speedy diagnosis and reporting, followed promptly by application of approved means of control. The promptness with which initial outbreaks are reported will determine to a great extent the method to be used in combating the outbreak.

Every effort should be made to assure prompt reporting of any disease of undetermined character, or any unusual incidents in connection with diseases already existing within a state. Such occurrences become subject to immediate investigation and receive such technical assistance as may be considered necessary by the state and federal BAI.

A good, countrywide system of reporting outbreaks of animal diseases should be established by cooperative action of the federal BAI, the state livestock sanitary boards, and other organizations interested in the livestock industry and animal health. Disease reporting is important for disease prevention measures and is needed for epidemiological studies or investigations. The prompt reporting of increased incidence of native diseases as well as the appearance of any unusual disease condition is essential for effective disease control. Several states have good reporting systems. Many do not.

The state livestock sanitary officials should keep all veterinarians in the state informed of (1) the location and extent of disease outbreaks and suspected outbreaks within the state, and (2) unusual diseases reported in neighboring states.

Planning for Field Operations

Veterinarians in charge of field activities should develop emergency plans for field operations.

State livestock sanitary officials should maintain up-to-date lists with the names and locations of all veterinarians within the state. Maps or lists showing locations of stockyards, auction or sales barns and the days that sales are held, rendering plants, dairies, cheese factories, milk collecting points, and slaughterhouses in the state will be useful if a prompt quarantine is required for disease control.

Lists should be prepared and maintained of persons or firms in various parts of the state who can be called upon to furnish needed equipment and supplies, earth moving equipment (state, county, private), disinfecting equipment (power spray units with supply tanks, small spray units), and disinfecting supplies (lye, soda ash, protective clothing, and other supplies).

Local Operations

The practitioner and the livestock owners are the keys to a successful defense against BW. Only with their full cooperation and active participation can such a program be effective.

Good preventive medicine is the normal goal and the ideal means of combating disease. The veterinary practitioner must be relied upon for interpretation and guidance in the field of veterinary preventive medicine.

The local practitioner will probably be the first to recognize an unusual increase in diseases or the presence of a new type of disease. The veterinarian should report detection of unusual diseases or conditions to the state veterinarian immediately.

The veterinary profession (practitioners, state livestock sanitary officials, and the veterinary assocations) should take the lead in further informing the farmer, the stockman, and the agriculture groups of the parts they play and the responsibility they must accept in the BW defense program.

The livestock owner must accept the responsibility of immediately reporting to the local veterinarian any unusual conditions among his animals. It is sound practice to have a veterinarian examine all flock and herd replacements to assure that only disease-free animals are acquired. These animals should also be isolated by the owner for at least two weeks before allowing them to come in contact with other stock on the farm or ranch. Similar quarantine precautions should be followed for animals returning from fairs and livestock shows. If a new disease should appear, every effort should be made to keep it from spreading. Sick or suspicious looking animals should be isolated until a definite diagnosis is made. Constant care is important in maintaining disease-free farm herds and flocks.

Information Programs for Animal BW Defense

The success of a disease control program depends upon the interest, support, and participation of those persons affected. This is directly determined by the degree of understanding, by the group concerned, of the problems and the gains to be made from the control program.

Ranchers, farmers, and farm groups are being continually informed through the USDA, state departments of agriculture, farm press, farm journals, radio, experiment stations, colleges and universities, and FCDA on disease prevention and control and the potential problems of BW. Such information includes:

(a) What they should do.
(b) Whom they should contact in case something unusual happens to their farm animals.
(c) How they can help prevent the introduction of disease into their farms and ranches.
(d) How they can aid in preventing the spread of disease if it should appear.
(e) The importance of reporting immediately any un-

usual incidence of native diseases or the appearance of diseases with unusual symptoms.

The veterinarian is responsible for recognizing new diseases among the livestock of his community. This requires keen observation and adequate knowledge of the various foreign animal diseases.

PROGRAM FOR DEFENSE OF PLANTS AND CROPS

In the plant field, many viruses and their vectors, fungi, certain bacteria, nematodes, and insect pests are considered as possible biological weapons. Here even a greater number of target populations and possible agents are found. Chemical materials also can be employed. Radioactive agents are not considered sufficiently toxic to be used intentionally against plants and crops. A critical appraisal of all the methods and types of agents available is essential in the development of an effective defense program for plants and crops.

The Hazard

An enemy might employ one or all of the following three methods in attacking plants and crops:

(a) Destruction during the growing season by chemicals.
(b) Similar destruction by widespread dissemination of pathogenic spores.
(c) Introduction, probably by covert means, of exotic pathogens or pests.

Fortunately, an enemy possessing only distant air bases is unlikely to attack with chemical anticrop agents since the cost and risks involved in air transportation and distribution of these agents would appear to outweigh the potential damage. Destruction during the growing season with inoculum of BW agents also seems a limited threat. Most of our important plants and crops could not be attacked effectively in this way. The possibility of an enemy creating epidemics of wheat stem rust by extensive spread of rust spores from airplanes has been mentioned in popular BW articles. But even in this instance an enemy could not attack our wheat with ease or assurance of success. To produce an epidemic in the season the wheat is inoculated, large quantities of viable spores would have to be spread over a considerable area early in the season. Even though an enemy could succeed in accomplishing this, the development of a destructive epidemic in the area inoculated would be dependent upon unpredictable weather conditions. Secondary spread of rust to grain fields also would be dependent upon meteorological conditions favorable for repeated rust infections.

Covert attacks will be seriously handicapped by the delay which would occur before extensive damage could be effected. However, this method seems to offer a good chance of success with comparatively low cost of preparations and relative difficulty of early detection. The pathogens or pests suitable as BW agents in a clandestine attack could be either introductions from a foreign country or certain of those now confined to limited areas in this country. To be most effective they should be capable of severely damaging our important crops, and there should be no immediately available measures to control them. The pathogens or pests must also be capable of persisting, accumulating, and spreading under our prevailing climatic conditions, since serious losses would be expected only after several years of spread. Many diseases and insects apparently meet these requirements and could be used against our important field crops, such as corn, wheat, oats, cotton, and potatoes. No attempt will be made here to list these diseases since they are well known to the plant pathologists and entomologists in federal and state services, who would be responsible for diagnosing and identifying new or unusual outbreaks of diseases or insect pests. Losses caused by the introduction of several pathogens and pests might have serious attritional effects and might curtail our ability to export food and materials of plant origin to our allies. Partial crop failures might be brought about by a BW attack, but starvation or serious privation of a substantial part of the population is not anticipated.

Defense Measures

The USDA and state agricultural agencies have had many years of experience in combating diseases and insect pests accidentally introduced into this country. For that reason, defense against deliberately introduced pests should not require development of new principles of control nor organization of new services. At the request of the FCDA, the USDA has assumed national responsibility for those BW defense measures which can be administered within its bureaus. This work will be carried out principally by the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry, Soils, and Agricultural Engineering, in cooperation with state agricultural experiment stations and departments of agriculture. These agencies have the following objectives: (1) interception of pathogens and pests at the ports of entry, (2) prompt detection of any new introductions, and (3) development of appropriate control measures for exotic diseases and pests.

Border Guards

The USDA, working in cooperation with the U. S. Customs Service, maintains specially trained inspectors at all U.S. ports of entry to prevent accidental introduction of foreign plant diseases and pests. These services have been alerted to the BW threat on crops and are taking measures to make deliberate introduction of pests into this country more difficult.

Services for Detection and Diagnosis

New plant diseases and pests are continually arising as a result of mutations of endemic pathogens or pests, hybridization, or accidental introduction from abroad. Each usually poses a unique method of control. For more than a quarter of a century cooperative federal and state disease and insect surveys have been in operation to assure prompt detection and reporting of new pests. Recently, these services were expanded to meet the threat of deliberate introduction of BW agents. The names and addresses of survey leaders are available to county agricultural agents in most states; similar information has been given all county mobilization committees (USDA Memo No. 60). In addition, state civil defense organizations have been apprised of these state detection and reporting services and have been urged to coordinate them with services within their own programs.

Nationwide, the detection and diagnosis program should function as follows: (1) farmers should report unusual disease or insect outbreaks to their county agricultural agents; (2) the county agent should screen these reports and refer any that he believes important to a designated state plant disease or insect survey leader; (3) the state leader, with the help of his associates, should identify the disease or pest and initiate appropriate control measures. In the case of a serious new disease or pest, the state leader should enlist the counsel and aid of the plant pathology or entomology specialists best informed on the particular group of pathogen or pest encountered. This group of trained investigators has been alerted by the USDA to the implications of biological attack on plants and crops and will continue to receive new information on pests which might be used as BW agents.

Obviously, the control measures adopted will depend upon the plant or crop involved and the nature of the specific disease encountered.

Disease and Insect Control Measures

For many years the problems of plant disease and insect control have been dealt with by plant pathologists and entomologists working along three somewhat different lines: (1) research specialists who attempt to solve new problems and devise improved methods of disease and insect control; (2) extension workers who promote the latest control methods by informing county agriculture agents, farmers' organizations, and groups of farmers; (3) regulatory officials who enforce state plant quarantines and other plant disease and insect control legislation. In the various states this work is carried on in state agricultural experiment stations and in state departments of agriculture. In the USDA, the plant disease and insect research work is done in the Bureau of Plant Industry, Soils, and Agricultural Engineering, and the Bureau of Entomology and Plant Quarantine. All federal control and regulatory work with respect to plant disease and insect pests is a function of the latter bureau.

Although the general principles of pest control are well established, application of these principles in the development of new control measures to combat exotic agents may be laborious and time-consuming procedures. Past experience has shown that the introduction of each disease or insect new to this country is likely to present entirely new problems of control. For many of the diseases under consideration the only feasible control will be the development of disease-resistant varieties through breeding programs that will probably extend over a period of 10 or 15 years. In the case of newly introduced insects, the subsequent introduction of other insect predators has often been an effective control measure. The vulnerability of our crops would be reduced and valuable time saved in developing control measures if some of the more destructive pests and pathogens not yet established in this country could be studied in their native habitat. Thus we could obtain information basic to the development of control measures in anticipation of introduction into this country.

Training

In the fields of plant pathology and entomology there is no body of professional practitioners, such as are found in the human and animal BW fields, who will require training. Each newly introduced disease or pest has usually posed a unique problem of control. Solution of these problems is normally the responsibility of a limited number of specialists familiar with most of the information available on the diseases or pests of the particular crop in question.

Suggested Collateral Reading

Metcalf, C. L., and Metcalf, R. L., *Destructive and Useful Insects*: McGraw-Hill Book Company, New York, 1951.

Walker, J. C., *Plant Pathology*: McGraw-Hill Book Company, Inc., New York, 1950.

CHAPTER 12

CIVIL DEFENSE

OCDM, familiarly known as Civil Defense, or CD (now called Department of Defense) was promulgated in its present form in 1958 as the National Plan for Civil Defense and Defense Mobilization. The basic National Plan is embodied in a single document and establishes nonmilitary courses of action, the roles of the federal government, the states, their political subdivisions, and of individual citizens in the event of an attack to enable the nation to survive, recover, and win.

Because Civil Defense and Defense Mobilization are vital parts of the nation's total defense, their continued existence is safe guarded by law and executive order, and their effectiveness is continually being strengthened by a vast amount of government research geared to the changing pattern of the implements of nuclear attack and defense. Its Commander-in-Chief is the President of the United States.

Today, civil defense is, to some degree at least, familiar to everyone. There is repeated reference to it in both press and periodicals; its working crews and equipment are in the forefront in every civil emergency or public disaster; and its emblem, the red CD in a white triangle inscribed in a circular blue field is seen everywhere.

These are the public manifestations of civil defense under peacetime conditions—or cold war conditions, if you prefer.

The vast bulk, however, of civil defense operates behind the scenes. It is something like an iceberg. The portion that appears above the surface is impressive, but it is the submerged mass that does the business. Day after day in county CD headquarters, in sector centers and in the rooms of local CD organizations, the preparation for defense, the staffing and training of key personnel and crews, the amassing of equipment, the stockpiling of food and medical and emergency supplies goes on. A few areas are more or less fully staffed, many have been brought to a point of acceptable adequacy, but in far too many areas, where the probability of direct attack is assumed to be remote, practically nothing has been done and the merest cadre of a civil defense organization exists.

Even where a top-notch organization is in operation, it is seldom that optimum manpower conditions prevail. For example, in Northampton County, Pennsylvania, there are 170 people on the county staff, operating through a combined manpower of 7000 in the five sectors of the county, and their 39 political subdivisions. The goal is 38,000 workers. And this is one of the outstanding county organizations in its state—certainly well above the average for the nation. Nationally, the requirement is 15,000,000 members.

The fact is that whatever has been done in the way of civil defense is excellent. That much more remains to be done simply means that the American people have before them that much more of a challenge to do it. And it had better be done.

It has been said that in the event of a nuclear exchange between this country and an enemy, the average American citizen would be exposed to risks about equivalent to those of an infantryman in Europe in the last war. This is a rather horrifying true analysis. But there is one way to reduce the danger—one line of defense—and the first mechanism of which to avail ourselves to set up this line of defense is already at hand in the civil defense organization as it exists today. It will certainly be bettered tomorrow, and it will continue to mushroom to the extent that we as individuals not only avail ourselves of it, but give to it our active support and participation.

No area of the country is so remote as not to require full civil defense organization. Aside from the certainty that fallout can be carried anywhere, even into the remotest hinterlands, in a matter of hours by the vagaries of wind and weather, there is a further and very important contingency that could overnight result in a literal explosion of civilian refugee population from congested areas thousands of miles away which have been subjected to direct attack. Even the seat of government might conceivably be withdrawn far to the interior. The problems of shelter, subsistence, civil administration, communications and supply which would face such an area, however remote, would be gigantic, and without some prior preparation, the result could be chaos. Civil defense is needed over every square mile of America.

Now civil defense, while it provides an answer to the problems of defense, is not the full answer. It is a means to our survival as a nation, as a people, and to some extent as individuals. It is in essence a Plan. Primarily, it will do six things of major importance:

1. It will give warning of attack by uniform warning signals.
2. It will provide for evacuation and shelter at the community level.
3. It will assist in survival. If civil defense is manned at full planned strength, this will be at the "block" level.
4. It will provide for communication and control.
5. It will form the basis of continuity of government.
6. It will be of vast importance in maintaining existence during the emergency.

The primary purpose of the National Plan is to provide protection for you, your family, your neighbors, and your fellow-Americans. But the Plan will work only if you—and your 175 million fellow Americans—make it work. The blueprint is here, but the real strength of the program can only be achieved with the active support and participation of all citizens. So, let's take a closer look at that blueprint.

HOW DOES TODAY'S CIVIL DEFENSE WORK?

Modern civil defense is nothing like civil defense in previous wars. Where once our danger was from fire bombs and high explosives, now it is from the nuclear bomb. The wide oceans that used to protect us no longer act as barriers to the global bomber and the ballistic missile. Today, we face more kinds of attack than ever before, and our danger is much greater.

WHAT IS CIVIL DEFENSE?

Civil defense is a way of saving lives and property. It is a way of protecting you and your family in case of war on the United States. It is a way of helping to keep you going, and to keep production going, in spite of nuclear, biological or chemical attacks.

One of the chief aims of civil defense is to help you to stay at work no matter what may come. Unless all of us kept at our jobs in the face of attack, the enemy would win the war. His aim would be to make you and others quit and desert your cities so that our defense plants would shut down. *Your* aim would be to keep working and to give our armed forces the things they need to beat the enemy.

CAN AMERICA BE ATTACKED?

Yes. At any time.

Right now enemy planes can reach every major city in the United States. We know that Russia has heavy, long-range bombers patterned after our own B-29. Most of these bombers could get through our defenses if an attack came.

We know Russia has atomic bombs, and is making more all the time.

We know that Russia is able to wage biological warfare. She has scientists who can prepare diseases for use against people, plants, and animals. She has trained secret agents who could spread them.

We know that Russia has the major war gases. We know that some of the German experts, who developed the new and deadly nerve gases, were taken into Russia at the end of the last war. We know that such gases could be used against us.

Nuclear bombs could be delivered by enemy aircraft. So could disease or poison gas. They could be delivered at any moment.

What is more, fifth columnists within our own country could strike at us with all three types of weapons. Saboteurs and enemy aircraft could attack at the same time. Or, saboteurs could start their work much earlier. With some types of biological warfare, they could begin work weeks or even months ahead of time, without waiting for a war to start, and with small chance of being detected.

CAN WE DEFEND OURSELVES?

There is no way of preventing most enemy bombers from reaching their targets in the United States.

Gen. Hoyt Vandenberg, Chief of Staff of the United States Air Force, has said that *at most* we could knock down only 30 out of each 100 enemy planes attacking the United States. At least seven out of ten would get through.

This does not mean that our Air Force is ineffective. We have a fine air defense, as everyone knows. We have good anti-aircraft guns, too. So had the Germans in the last war. But, the entire strength of the German air force and all Hitler's anti-aircraft batteries were not able to stop our attacking bombers. On the average, we lost *fewer than ten out of each hundred planes.*

The Distant Early Warning System (DEW Line) of defense, with its correlated SAC interceptor planes, operating under 24-hour full war-time alert have been brought to a state of amazing efficiency, which will be vastly augmented with the newer BMEWS (Ballistic Missiles Early Warning) giant radar bases now being built. Missile-type weapons which seek out their prey while it is still hundreds of miles from our borders, follow its course unerringly, and intercept and destroy it, are already a reality. Much of this type of defense is highly classified, but some of the information has already been released, and more will follow.

You can be sure that everything possible will be done to stop the enemy at our borders, and to stop sabotage before it starts within our borders. But you also can be sure that, in case of war, a good percentage of enemy attacks would be successful in spite of all we could do.

That is why we must have civil defense—and have it now!

We cannot prevent enemy attacks from happening—but we can keep them from knocking us out of the war. If we know what to do we can save lives and property, restore our cities and get back into the fight no matter what form those attacks might take.

There is no sure way of keeping enemy planes from getting through—but there is a sure way to save many thousands of lives if we are attacked. Civil defense is the way, and the *only* way.

There are good defenses against the atomic bomb. There are ways to save thousands of people from the worst effects of blast, heat, and radioactivity. There are ways to take shelter, and to rescue the trapped and injured, and to cut fire losses to a minimum. All the recommended ways which civil defense has developed have been included in this *Family Survival Handbook.*

There are good defenses against biological warfare. There are ways of keeping disease from spreading, and of protecting our food and water supplies, and of saving our crops and livestock. Civil defense, working with existing health agencies and physicians, can do the job.

There are good defenses against poison gases. We do not know that war gases would be used against us, but we should be prepared, and we can be. There are ways of preventing the worst effects of such gases from taking effect. Civil defense can provide the answers.

Civil defense services can be organized to bring in help from outside, and to get a stricken city back into working order in the shortest possible time. Civil defense can provide food, shelter, and medical care for the victims of enemy attack.

Civil defense can make it possible for you to stick with your job, your home, and your family no matter what might come. It can make staying in your city safer than trying to get out of it.

But we must face facts. Civil defense takes planning, organization and a lot of hard work. It would not protect every life and every home. However, with civil defense, *most* people and *most* homes could be saved.

WHAT WOULD HAPPEN IN YOUR CITY?

Imagine even one nuclear bomb being dropped on an American city—your city, for instance. Many thousands of persons would be killed instantly. Many thousands of others would be wounded and in need of immediate care. Many hundreds more would be trapped or buried in the wreckage. Every street within the major damage area would be completely blocked with rubble. Fires would start within a matter of minutes in many places at once.

These are the main things that would happen, but there are others. For instance, a large part of the city's food supply might be destroyed or cut off. The water supply might be knocked out. Regular communications might stop entirely. Much of the transportation system certainly would stop. Thousands of survivors would suddenly find themselves homeless, without food, clothing, or shelter.

WHAT ARE THE BIGGEST CIVIL DEFENSE PROBLEMS?

Public education, training, and organization.

We need quick civil defense training for some 15,000,000 Americans, and intensive education in self-protection for 135,000,000 more. The most staggering civil defense problem is the size of the training and organization jobs to be done.

Try to picture the number of trained workers that would be needed to handle an attack situation. As an example, a single first-aid station should consist of almost 200 workers. They could handle about 600 wounded people in 24 hours.

Nearly 100 such first-aid stations would be needed to care for those injured by one Hiroshima-size atomic bomb. So, more than 20,000 first-aid workers would be needed for each atomic bomb, and this doesn't include hospital staffs.

Before first-aiders could reach the wounded, an engineering service as large, or even larger, would be needed to clear the rubble. A highly trained rescue service would be needed to get people out of wrecked or burning buildings. A large and efficient supply service would be needed to bring in food, clothing, and medicine. There would be the other jobs of putting out fires, restoring utilities, caring for the homeless, gathering families together again, feeding the people, and getting factories and community life rolling once more.

Most of the ways of meeting atomic disaster are not new or different, except in size. The biggest problem is to prepare ourselves to meet catastrophes greater than any that ever have struck the United States. The problem can be met only through civil defense. Each of us must have a job to do if trouble comes—*and must know how to do it.*

WHO IS RESPONSIBLE FOR CIVIL DEFENSE?

You are.

Civil defense is set up by federal and state law. But no law in the world will work unless you back it up by your own actions. That is why, in the end, the responsibility for civil defense is yours.

The thing to remember is this: If the bombs from enemy planes ever fell on your city, they would not fall on a plan, or an organization, or a system of government. They would fall on you and your family and friends.

If you were a soldier, you would be trained to take care of yourself and keep on fighting. As a defender of the home front, you must learn to protect yourself and keep on working. Despite every precaution, a soldier might be killed. So might you. But the more you know, and the better trained you are, the better your chances for survival.

The whole idea of civil defense is to help you protect yourself, and to make the best use of your own special ability and skill in an emergency. Then you will be able to save yourself and others if trouble comes.

What Is The Federal Government's Part?

The Federal Civil Defense Administration does the basic planning, gives technical information to the states, pays part of the cost of equipment and shelters, and provides some kinds of emergency supplies. The Federal Government does not run civil defense. The operation of civil defense begins at your state line.

Where Do The States And Cities Come In?

It is the job of the states and territories, and their counties and cities, to organize civil defense among their own people. The Federal Government has supplied the blueprint. The states and cities must build the machine and make it run.

The person in charge of civil defense in your state is the

State Civil Defense Director. He is appointed by the Governor. In your city it is the Mayor, or your local Civil Defense Director. He and his staff organize and direct civil defense. To do this they must find and train thousands of volunteer workers. They cannot do this without your help.

What About The Armed Forces?

The job of the Armed Forces is to win a war, mainly by carrying the attack to the enemy. Civil defense is not their responsibility.

This does not mean the Armed Forces are taking a hands-off attitude toward civil defense.

Armed Forces experts have worked with the Federal Civil Defense Administration to determine which areas are most likely to be attacked. Armed Forces experts also have told the Federal Civil Defense Administration what kinds of attack could be expected and what to do about them.

The Armed Forces do have some definite civil defense jobs, such as making decisions on blackouts, dimouts, camouflage and radio silence. Through the air raid warning service, the Air Force warns civil defense authorities that an attack is coming.

The Air Force operates the radar screen and the ground observer system. It must do this in order to know when and where its own fighter planes are needed to meet incoming bombers. The Air Force would give warning to civil defense officials if enemy planes were sighted.

State and local civil defense directors could then sound the air-raid warnings in their own states or communities. Once the warning had been given to the civil defense system, however, the Air Force job in civil defense would stop.

Another job which the Armed Forces would have—and they are the only ones with the technical knowledge to do it —would be to dispose of unexploded enemy weapons like bombs and artillery shells.

If America ever should be attacked, the Armed Forces would do all in their power to help the civil defense authorities.

CIVIL DEFENSE GETS YOU READY

What Does Civil Defense Do Before An Attack?

Civil defense gets you ready to meet an attack. It gives you information on such things as how to safeguard your home, how to fight fires, and what steps to take against atomic, biological, and chemical warfare.

Civil defense arranges for shelters in your city, and operates the warning system that would tell you when to go to those shelters.

Civil defense is getting medical supplies and special equipment ready. It also is training technical services needed to restore a stricken area. Finally, civil defense is organizing mutual aid and mobile support.

What Is Mutual Aid?

Mutual aid is help from the neighbors.

Alone, an attacked city, no matter how well organized or prepared, could not take care of itself entirely. It would have to look to neighboring cities or suburbs for help. That help must be just as well organized and trained as the civil defense organization in the city itself.

Many cities have drawn up agreements to help each other in case of disaster. These are known as mutual aid pacts. This obligates the communities to come to the aid of one another if attack occurs.

For instance, if your city were struck, a nearby town might send its fire, police, and rescue crews to help out. By the same token, if that town were hit, your city would do the same. Mutual aid works both ways. Many states, too, have mutual aid pacts.

What Is Mobile Support?

More help. But on a state-wide or interstate scale.

Mobile support is made up of teams that can move rapidly. These teams would be loaded into cars or trucks and rushed to the scene of the disaster. The stricken area might be in another part of the state, instead of next door. Or it might be in another state altogether.

Mobile support groups will be manned by people on farms or in small cities and towns outside of critical target areas. They will assemble outside of critical target areas and function just like the civil defense organizations in the cities.

Some states do not call their mutual aid or mobile support systems by those names, and not all are organized exactly alike. The important thing is, all states have a "help from the neighbors" operations plan.

If You Don't Live In A City, Should You Take Part in Civil Defense?

Yes. Civil defense is your business no matter where you live.

If you are a farmer, if you raise livestock or crops, you are on the high priority list for some kind of biological warfare attack.

If you are not a farmer, but a resident of a small town, you still have a special kind of civil defense job—helping and sheltering bombed-out people.

Let's make it clear that the people of the big cities are not going to take to the hills. Nevertheless, in case of enemy attack, some people might have to be moved out of a city because their homes had been gutted by fire or otherwise made unlivable.

Young children, expectant mothers, invalids, and older people would have to be cared for. Your locality might be named as an evacuation area for this purpose. If you are anywhere within reach of a major city, hospital facilities in your community surely would be tagged as reception areas for casualties.

To sum it up, if you live in a large city, you will have a civil defense job to do. You will serve both as part of the civil defense team and as a member of a family which must make every effort to take care of itself. If you do not live in a large city, you still have a civil defense job to do in helping others.

Would All Parts Of The Country Be Attacked At Once?

No. Not every home is in direct danger.

Making an attack is expensive, even with regular bombs. Making it with nuclear weapons is a whole lot more expensive. An enemy would attack, with nuclear or atomic bombs, only targets that would "pay off" in large-scale damage to the nation's war plants or to the morale of its citizens.

You can see for yourself, just by looking at a population or industrial map of the United States, that there are a limited number of areas that would be worth a nuclear attack. These target areas have not been announced publicly. Each Governor has been told the targets in his own state only.

To publish the whole list would tell the enemy a few things he would like to know. At the very least, it would confirm his own estimate of the situation.

Do You Live In A Critical Target Area?

Look around you.

Your knowledge of your own community will give you a pretty good idea of whether or not it is a critical target area. You know what industries are located in your town. You also know, pretty much, whether or not they are important to the war effort. One such industry generally does not make a critical target area. Many such industries definitely do.

If you live in a city of more than 50,000 people, you probably live in a critical target area. But the best way to know is to watch how your community organizes for civil defense. Newspaper stories or radio broadcasts about that organization will tell you a great deal.

What Must You Do First?

You may not be able to volunteer for active civil defense work. But you still have an obligation which directly concerns yourself and your immediate family.

You should know how to prepare yourself against nuclear attack, biological warfare, or poison gases. You should know how to fight fires. How to take shelter and how that shelter should be built and equipped. It is your responsibility to familiarize yourself with every problem of home defense and to have every answer at your fingertips.

The *Family Survival Handbook* will help you to learn the answers. All the information contained here has been taken from official U. S. Civil Defense booklets, and represents the most authoritative data on civil defense available to anyone. What we have done has been to bring together in one volume all the material heretofore available only in scattered booklets and folders, and to present it here in orderly, readable manner, carefully arranged and indexed so that you may refer instantly to any subject. Read and re-read its contents thoroughly and keep the *Handbook* where you can put your hands on it at any time.

In Appendix C, page 284, you will find a list of official publications. By all means get them. Even though they may add little to what the text of this manual has provided, they will —by the mere fact of repetition—serve to make your knowledge of the subject that much more comprehensive. In addition, your state or city may have special publications of its own that you should read.

Look the facts in the face. If the United States is attacked, you know that many thousands of people will die. Whether or not you are one of them can depend to a large extent on how well you have learned to protect yourself.

Make sure you and your family know what to do, and you will effectively multiply your chances of surviving.

SHOULD YOU VOLUNTEER FOR A CIVIL DEFENSE JOB?

Yes—right away.

Every good American will want to volunteer for civil defense. Every thinking citizen knows there is no other way to recruit the millions of workers who will be needed.

Being a civil defense worker is not a job for those who can't face facts or who aren't willing to work. It is a job for real Americans with courage. If we are attacked (and remember that we can be attacked), the hard, terrible task of getting our cities back on their feet will fall mainly on civil defense volunteers.

No one can do the civil defense job but the American people themselves. The Armed Forces have another job to do. There are not enough people in federal, state, or local government agencies to do the job for us. One local civil defense organization has adopted the slogan "Service Means Survival." That about sums it up. A good, tough, determined civil defense program can mean survival for the American people.

How Do You Volunteer For Civil Defense?

Your newspapers, radio or television stations will be glad to tell you. Also, you can watch for announcements from your local civil defense director. Or you can phone or visit your local civil defense headquarters.

The Red Cross is part of civil defense. Right now your Red Cross chapter is ready to train you in first aid. This training will be required of all civil defense volunteers. But whether or not you are able to volunteer, you should take the latest Red Cross first-aid course. Home nursing and nurses' aide courses are given by the Red Cross, too. These courses may save a life in your family some day, war or no war.

In addition, blood doners are needed. Thousands of pints of blood and plasma would be needed after an enemy attack.

WHAT SERVICES CAN YOU JOIN?

There are ten major volunteer services, all of them vital.

For the sake of national uniformity, the Federal Civil Defense Administration has named the following services as official: Warden, Fire, Police, Health, Welfare, Engineering, Rescue, Communications, Transportation, and Staff. Some 15,000,000 trained volunteers will be needed to man these various services.

The Warden Service

The warden service is the backbone of civil defense. It is the source of local civil defense leadership before, during and after an attack. It is the warden's job to save lives first and property next.

Before an emergency, the warden's main duty is that of teaching. During an emergency, he conducts people to safety. After the emergency, he restores order.

Wardens must be volunteers, well-known and respected in the community, whose leadership will be accepted by their neighbors or fellow workers. As a general rule, each warden post will be responsible for a residential block or factory area where about 500 people live or work. Several wardens may be assigned to such a post.

Wardens will teach people how to protect themselves, instruct them in civil defense regulations, and distribute civil defense information. They will keep lists of the people in their charge and gather information about buildings and equipment in their neighborhoods.

Wardens' records will include the home address, age, and physical condition of all persons in their charge. Wardens also should know which people need special care and how to get in touch with their relatives and friends.

If a warning sounded, wardens would conduct workers or the occupants of buildings to safe areas. It would be their job to prevent panic, render first aid, and perform light rescue duties. If needed, they also would help other services to fight fires and clear debris.

Immediately after attack, the warden would take a roll call of all people in his area. If anyone was missing, or needed nursing or medical attention, the warden would report the facts at once to the control center. The warden service also would help restore the orderly life of the community after an attack.

The warden service works directly with individuals, families, neighborhoods, and employee groups. The warden is the link between the specialized civil defense services and the people. Outstanding men and women who can assume responsibility are urged to vounteer for the warden service.

Women, and especially housewives, play an important part in the warden service. Most women are at their home posts day and night. Usually they know their own neighborhoods better than men can ever know them. Women should interest themselves in the warden service as a first step in the organization of civil defense for their neighborhoods.

The Fire Service

Getting ready to fight fires is a big part of the civil defense job.

After a nuclear explosion, the resulting fires could cause more loss of life and property than the blast itself.

Bombing might cause great fires in the area of the burst. It also could start hundreds of small fires in surrounding areas. These smaller fires could only be fought by people on the spot, because the regular firefighting companies would be fully occupied by the main fires.

Teaching of householders to fight fires will be carried out by instructors trained by their local fire departments, using hand equipment. Trained auxiliary or reserve firemen will be recruited to back up the regular companies.

People in critical target areas must know how to fight fires at home or at work. At least one member of your family should be trained in the use of basic fire-fighting tools and methods. Because women are at home much of the time, they are urged to learn how to put out fires in case of emergency. Your warden or your local civil defense headquarters will tell you where to volunteer for such training.

The Police Service

There would be two big police problems in the event of enemy attack. The biggest would be the control of traffic. The next biggest would be the regulation of people, including control of panic. Civil defense volunteers for the police service would have important duties in both fields.

Many communities now have auxiliary police to supplement their regular police forces and help handle traffic, parades and unusually large crowds. These will be used in civil defense work. Such auxiliary police will be a part of local police departments. They will be under the command of regular police officers, and will have such authority as may be given them by local law.

The police service seeks volunteers not eligible for military draft, and over-age or retired persons with police experience. Women also may be recruited for clerical police tasks in communications and traffic control, and for handling juvenile problems or police problems affecting other women.

The Health Service

The health service needs all persons with experience in work that has to do with health or medicine. It also needs volunteers who can be trained in special weapons defense—which means defense against atomic, biological, and chemical warfare. Finally, it needs untrained volunteers who can do manual and clerical work. Thousands of such volunteers will be needed for the big job of protecting the health of a city after an attack, and caring for the injured.

Professional people of the health fields will be a part of civil defense, and will be contacted by their local civil defense organizations. In addition, however, willing hands are needed to do many kinds of work under professional direction. If you have had any related technical training—or even if you haven't—the health service can find a useful job for you.

Thousands of first-aid workers will be needed. This does not mean merely people who have had first-aid training. It means people who can be organized for definite jobs at first-aid stations. The health service also must have thousands of women volunteers who have taken home nursing and nurses' aide courses.

Men are asked to volunteer as litter bearers, ambulance personnel, hospital orderlies and attendants, supply handlers, and maintenance workers. Extra sanitation workers and food inspectors will be needed for our defense against disease and gas warfare, and against radiological contamination.

The radiological monitoring teams will need teachers, or advanced students of physics and other related sciences, as team leaders. High-school graduates who have taken physics courses will be needed as members of such teams. So will some radio repairmen.

Many thousands of clerical workers will be recruited by the health service. In the event of enemy attack, records must be kept of ill or injured persons, and the dead. There will be room for many volunteers who can be taught to help in laboratory work. The blood collection service, which is coordinated by the American National Red Cross, needs people who can help in the procurement of blood.

Women especially are urged to interest themselves in the health service as part of the civil defense program. Even if your only skill is the ability to wash laboratory glassware or mop floors, the health service will have a place for you in its vitally important work of saving lives.

The Welfare Service

In case of disaster many families might find themselves homeless and without food, clothing, or money. The emergency welfare service would provide these things, in addition to locating missing persons and caring for infants, the aged, and the infirm.

If an attack comes, the welfare service will gather and pass on news of people who are separated from their families and register those who must receive individual care. Welfare workers will contact relatives in other cities, and refer families to places where they can get special help.

Many volunteers will be needed in this field, and you can be one of them. If you live near a large city, it may be possible for you to offer room in your home to bombed-out persons. You may be called upon to help feed large numbers of persons who have been evacuated. You may be needed to help distribute clothing. Or you may be asked to care for homeless children.

All these are welfare service activities. Training courses will be available in the various branches of welfare work, under experienced instructors. Women particularly should interest themselves in this end of the civil defense program. By background and experience, women are especially good at caring for others in time of need.

The Engineering Service

The engineering service would restore damaged facilities and clear away debris after an attack. Its job would be to get a stricken city back into working order as soon as possible.

Members of the engineering service would include persons with experience in building trades, utilities, or the construction industry. The engineering service seeks first of all to enlist whole organizations that have trained men and equipment already at their disposal.

Local civil defense will use existing engineering groups in their present form without breaking them up. That is, men now employed by public works departments, utility departments and contracting firms would do the same kind of work in the event of enemy attack. They would work under their regular supervisors, but with civil defense direction.

Men are needed who know how to operate special equipment, such as cranes, bulldozers, dump trucks, and welding machines. In addition, there will be need for volunteers in the labor force that would help clean away wreckage and open the streets to traffic.

Extra help will be recruited from equipment and material dealers, labor unions, engineering schools and other groups that have skilled workmen, tools, and material. If you have experience in the construction industry, you should consult the head of the engineering service in your local civil defense organization about volunteering for this important work.

The Rescue Service

Many people would be trapped by debris during an enemy attack. Escape from many structures would be blocked.

The job of the rescue service would be to remove trapped persons, many of whom might be injured. It also would rescue those who were trapped, but uninjured. The test of a good rescue service would be the speed and skill with which such victims could be freed. In England during the last war, properly trained, organized and equipped rescue teams were the real heroes of the Battle for Britain. They saved thousands of lives.

Rescue teams will have their own specially equipped rescue vehicles. Rescue work is mainly an engineering job. It requires some basic engineering knowledge of shoring, rigging and building construction. Rescue team members will be drawn from the building trades and similar occupations. Practical training and good judgment are essential. Untrained rescue workers often make a bad situation worse by causing additional collapse. They create more casualties, and sometimes become casualties themselves.

Rescue teams will be made up of eight men each. Three teams, working eight-hour shifts to provide around-the-clock operation, will be assigned to each rescue vehicle. These three teams will be known as a rescue squad. A willingness and ability to work as a team under emergency conditions is a requirement for the good rescue worker. He also must possess the strength and stamina to perform the hard work required.

The Transportation Service

In case of enemy attack, a lot of people and equipment would need moving from one place to another in a hurry. The injured would need transport to hospitals. Emergency food and medical supplies would have to be rushed into the stricken area. Thousands of trained workers would be required for the transportation service.

If you are a skilled driver, there may be a place for you in the transportation service. It will teach people to drive in organized fleets under emergency conditions. Where necessary, it will also teach simple repair and maintenance work. Assembly points will be set up and a mission will be assigned to every volunteer and every official vehicle.

Women can be very useful to the transportation service. In the last war many women acted as drivers for the military and the Red Cross.

Persons with operating skills in rail, air, and water transport also will be needed by civil defense. Such persons will be contacted by their local civil defense transportation service, through employers or union organizations.

The Staff Service

Local civil defense headquarters will need a lot of administrative people for staff work. Records must be kept. Letters must be written. Telephones must be answered. If you have had any experience in typing, filing, or running a switchboard, there may be a volunteer job for you in the staff service.

If you have experience in any technical phase of civil defense, you may end up with a supervisory job of your own. You would need a thorough knowledge of your special subject. You would be expected to know how to train or direct other people in that field.

Staff jobs in civil defense are positions of great responsibility. If you have a real background in any of the technical skills, vocational training experience, or administrative ability, you should offer your services as a staff worker.

The Communications Service

The communications service is the nerve center of civil defense.

In handling a disaster of any kind, everything depends upon good communications. That is doubly true of civil defense operations in the face of enemy attack.

Control centers must keep in touch with one another. Air raid warnings must be relayed promptly. There must be some reliable way of directing the fire, police, rescue, warden, medical, and engineering services. Unless headquarters knows what is happening, and where it is happening, it cannot get the damage under control.

Thousands of volunteers will be needed to man the communications network for civil defense. If you have any technical training in radio, television, telegraph, or television work, you will be needed in this service. Women volunteers can be specially useful in answering phones and in operating message centers.

WHAT DOES ALL THIS ADD UP TO?

Civil defense adds up to just one thing—your help is needed now. In this book you have read about only the highlights of civil defense. There are thousands of jobs that cannot be described in these few pages. Find out what those jobs are. Find out where you can serve best. Then—volunteer for work you can do.

Millions of Americans must be trained in civil defense before our country can call itself ready for enemy attack. Meanwhile, that attack might come at any time. Former Federal Civil Defense Administrator, Millard Caldwell, has said that we have not a moment to lose in preparing ourselves. Your home, your job, your family, your very life may be at stake.

Make no mistake about it—civil defense is here to stay. It may be a part of our lives for years to come.

The outcome of modern war is not decided by armies in the field. Wars today are won or lost on the home front. The home front cannot be hidden, and it cannot retreat—not if we are to survive as a free people. That puts the problem squarely up to you.

What civil defense will not do, what it cannot do, is this: It will not be able, in the event of nuclear attack, to miraculously have an expertly trained squad at your side to tell you what to do and to conduct your family to a place of safety. Here, at the level of your own home and household, you will be, for those first terrifying hours, completely on your own. You will have to become your own trained expert, and the only shelter available will be such as your own foresight has provided. Your survival under such an emergency will depend largely on how well you have prepared yourself.

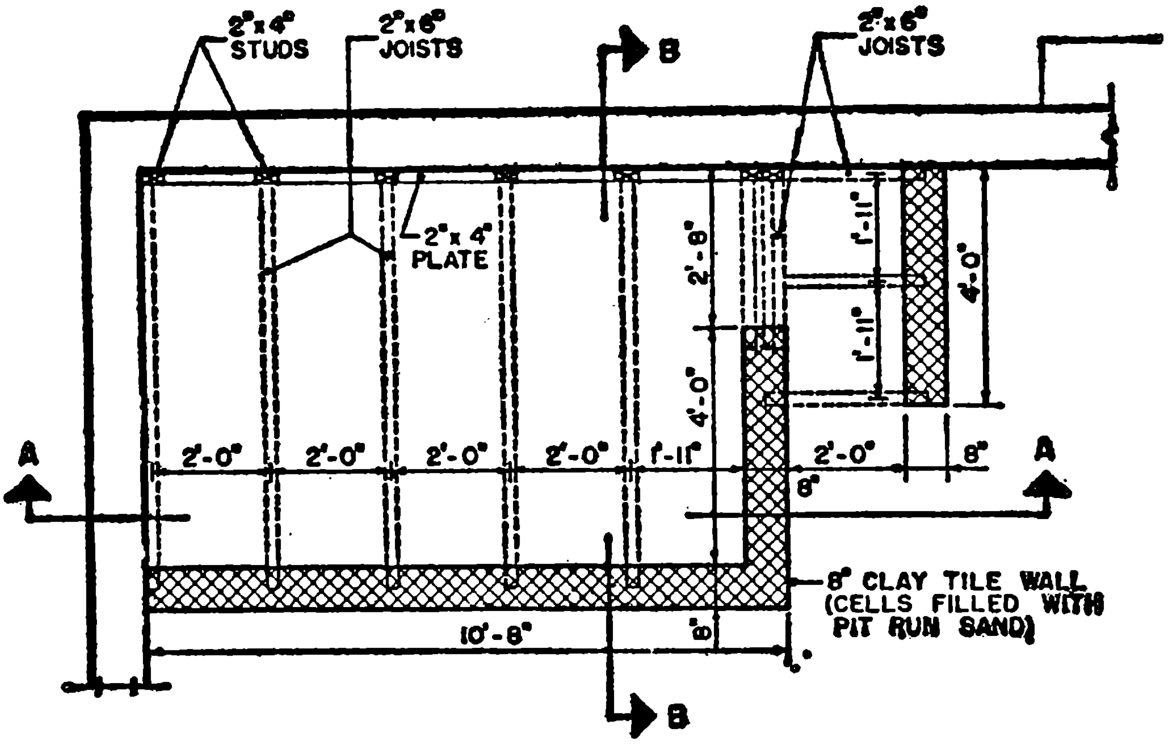
It has been the sole purpose of this *Family Survival Handbook* to tell you how you can best prepare for the safety and survival of your own family group until help can reach you.

Now you take it from here.

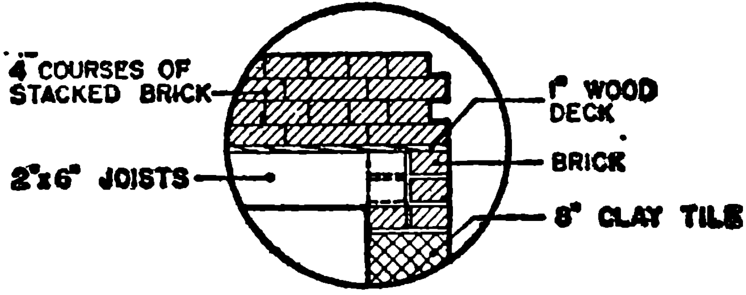
APPENDIX A

PLANS OF FALLOUT SHELTERS

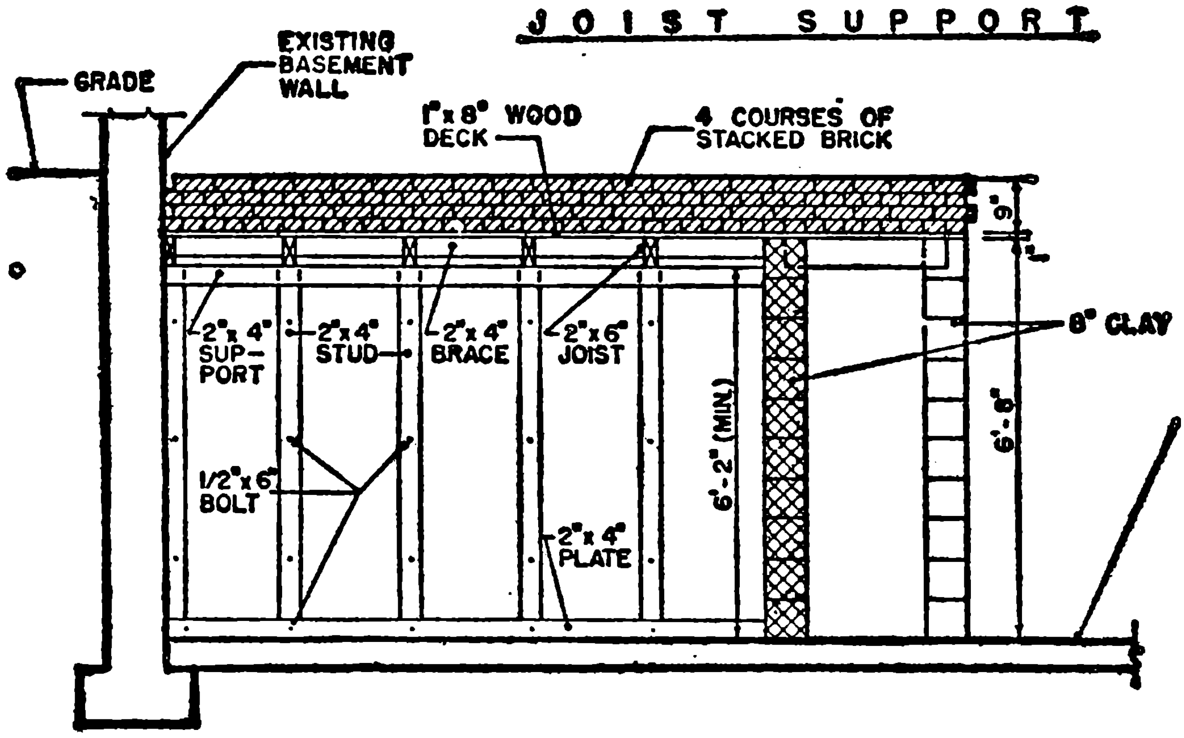
The fifteen double-page plates on pages 250-279 have been redrawn from official sources, including the Office of Civil and Defense Mobilization (now called Department of Defense) especially for this *Family Survival Handbook.*


2"x 4" STUDS
2"x 6" JOISTS
B
2"x 6" JOISTS
2"x 4" PLATE
2'-8"
1'-11"
1'-11"
4'-0"
4'-0"
A
2'-0"
2'-0"
2'-0"
2'-0"
1'-11"
2'-0"
8"
8"
A
8" CLAY TILE WALL (CELLS FILLED WITH PIT RUN SAND)
10'-8"
8"
B

PLAN

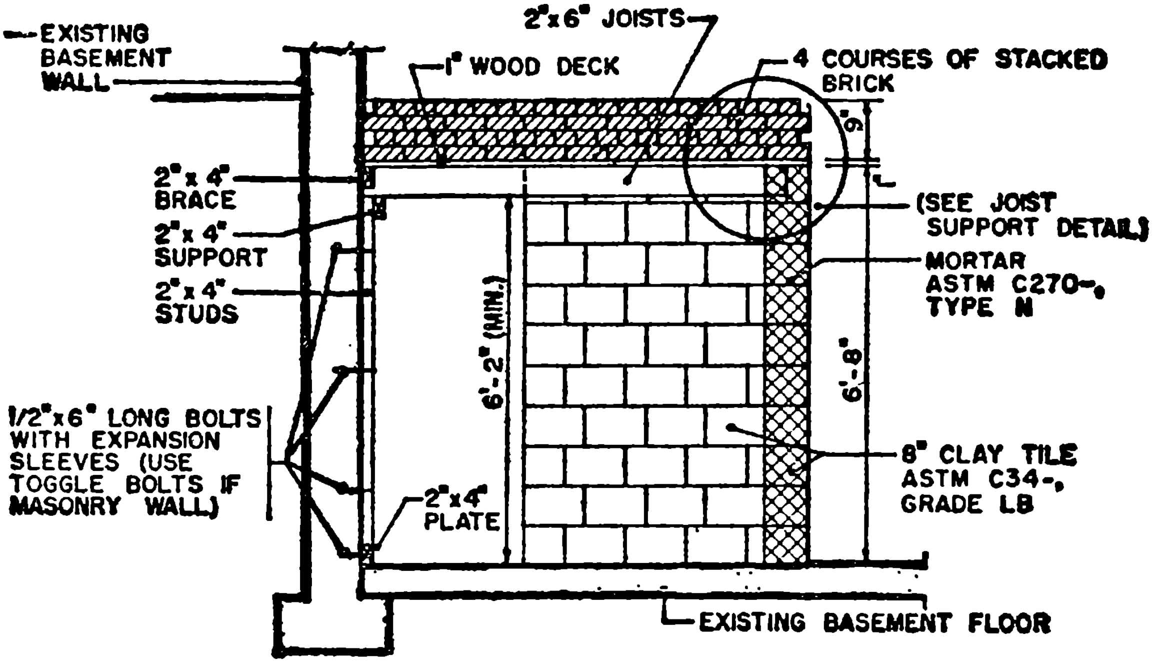

4 COURSES OF STACKED BRICK
2"x6" JOISTS
1" WOOD DECK
BRICK
8" CLAY TILE

JOIST SUPPORT

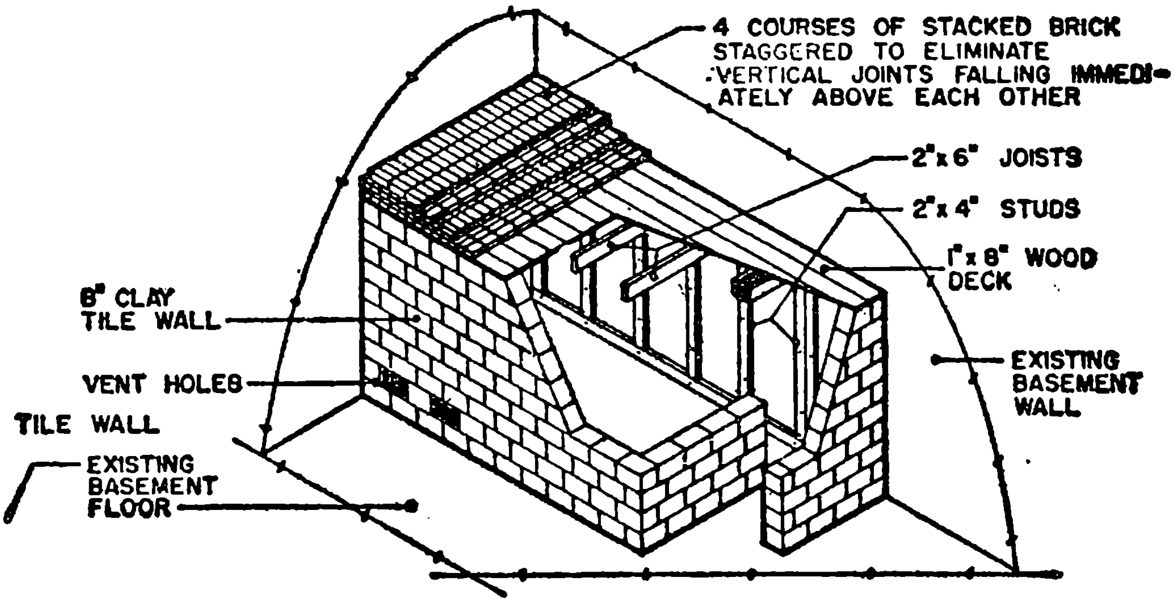

GRADE
EXISTING BASEMENT WALL
1"x 8" WOOD DECK
4 COURSES OF STACKED BRICK
9"
2"x 4" SUP-PORT
2"x 4" STUD
2"x 4" BRACE
2"x 6" JOIST
8" CLAY
1/2"x 6" BOLT
6'-2" (MIN.)
6'-8"
2"x 4" PLATE

SECTION A—A

PLATE 1—BASEMENT FALLOUT SHELTER
Existing construction; clay masonry details.


EXISTING BASEMENT WALL
2"x6" JOISTS
1" WOOD DECK
4 COURSES OF STACKED BRICK
9"
(SEE JOIST SUPPORT DETAIL)
2"x 4" BRACE
2"x 4" SUPPORT
2"x 4" STUDS
MORTAR ASTM C270-, TYPE N
6'-2" (MIN.)
6'-8"
1/2"x6" LONG BOLTS WITH EXPANSION SLEEVES (USE TOGGLE BOLTS IF MASONRY WALL)
2"x4" PLATE
8" CLAY TILE ASTM C34-, GRADE LB
EXISTING BASEMENT FLOOR

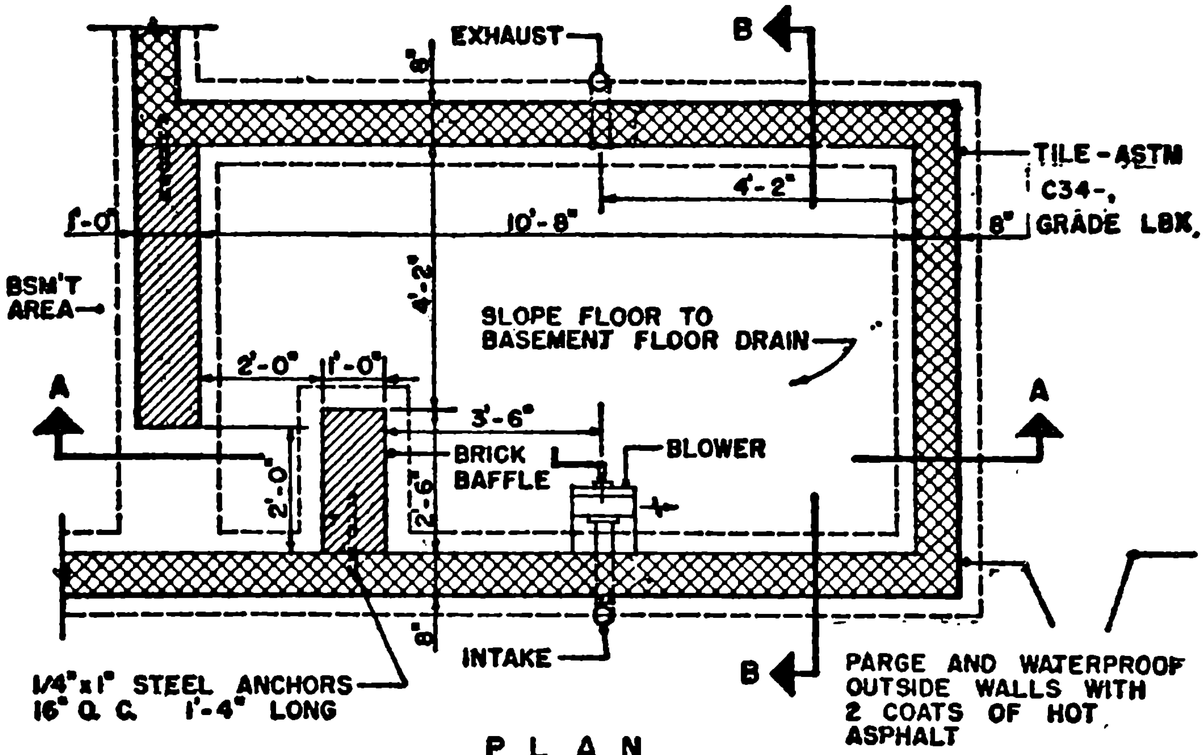
SECTION B-B


4 COURSES OF STACKED BRICK STAGGERED TO ELIMINATE VERTICAL JOINTS FALLING IMMEDIATELY ABOVE EACH OTHER
2"x6" JOISTS
2"x 4" STUDS
1"x 8" WOOD DECK
8" CLAY TILE WALL
VENT HOLES
TILE WALL
EXISTING BASEMENT WALL
EXISTING BASEMENT FLOOR

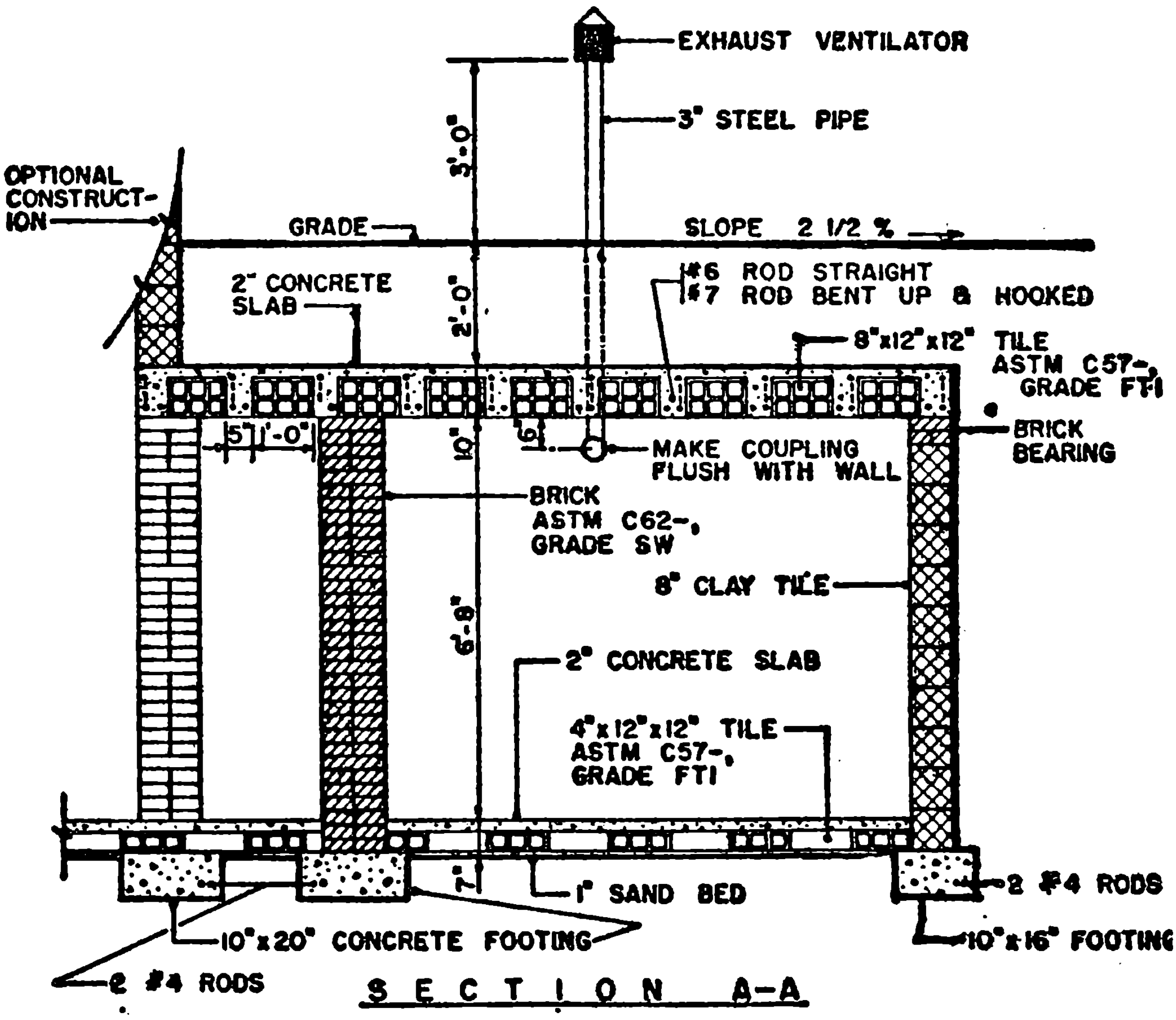
ISOMETRIC

0 1 2 3 4
SCALE IN FEET

From Plans of Structural Clay Products Institute

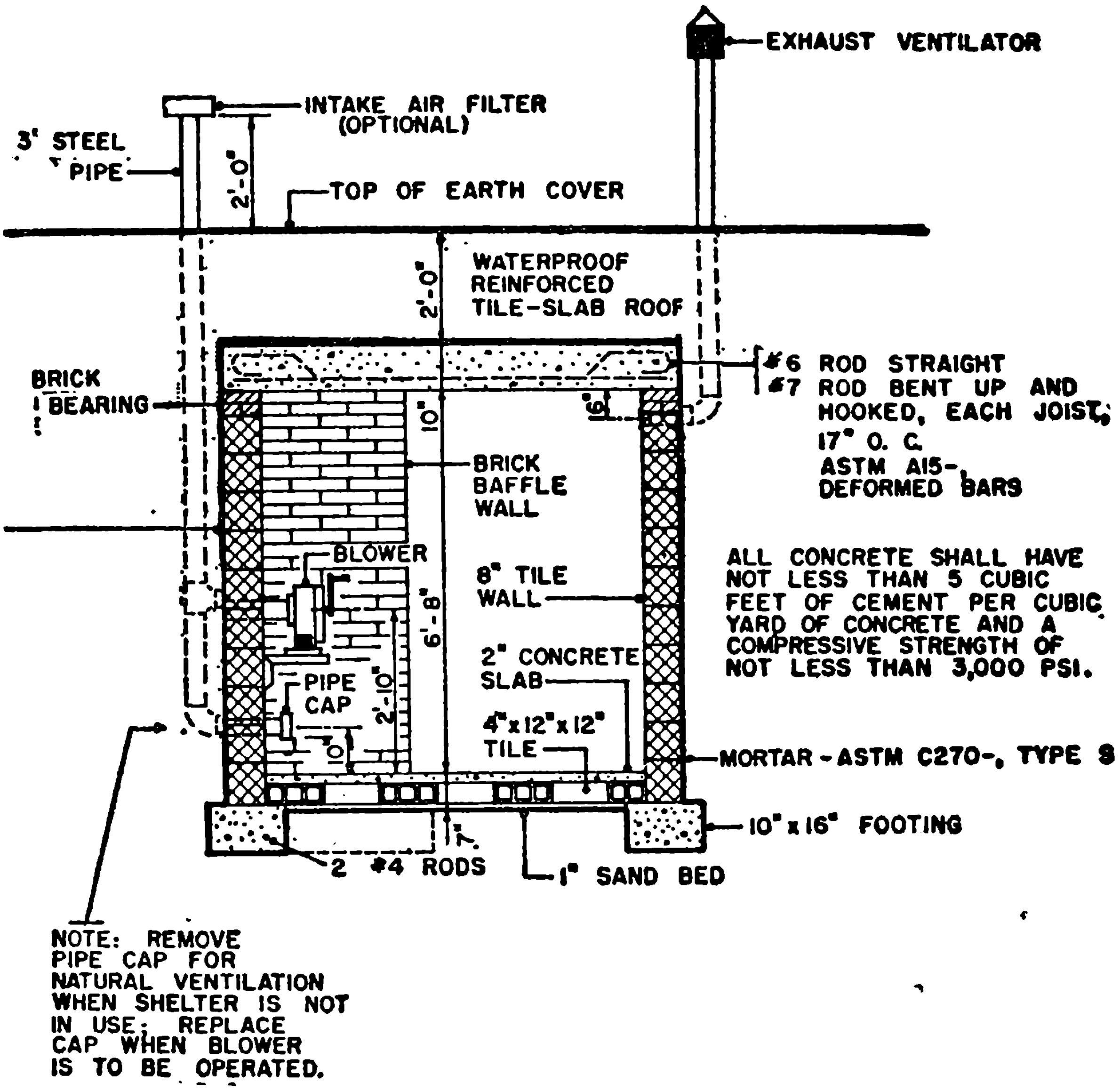

EXHAUST
B
8"
TILE - ASTM C34-, GRADE LBX.
4'-2"
1'-0"
10'-8"
8"
BSM'T AREA
4'-2"
SLOPE FLOOR TO BASEMENT FLOOR DRAIN
2'-0"
1'-0"
A
A
3'-6"
BRICK BAFFLE
BLOWER
2'-0"
2'-6"
8"
INTAKE
B
1/4"x1" STEEL ANCHORS 16" O. C. 1'-4" LONG
PARGE AND WATERPROOF OUTSIDE WALLS WITH 2 COATS OF HOT ASPHALT

P L A N

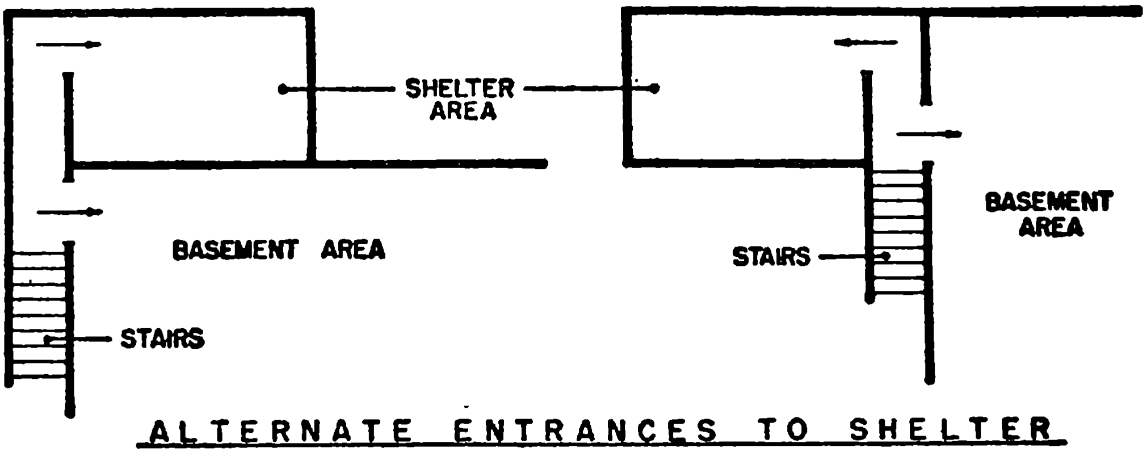

EXHAUST VENTILATOR
3'-0"
3" STEEL PIPE
OPTIONAL CONSTRUCTION
GRADE
SLOPE 2 1/2 %
2" CONCRETE SLAB
2'-0"
#6 ROD STRAIGHT
#7 ROD BENT UP & HOOKED
8"x12"x12" TILE ASTM C57-, GRADE FT1
5"
1'-0"
10"
5"
MAKE COUPLING FLUSH WITH WALL
BRICK BEARING
BRICK ASTM C62-, GRADE SW
8" CLAY TILE
6'-8"
2" CONCRETE SLAB
4"x12"x12" TILE ASTM C57-, GRADE FT1
7"
1" SAND BED
2 #4 RODS
10"x20" CONCRETE FOOTING
10"x16" FOOTING
2 #4 RODS

SECTION A-A

PLATE 2—BASEMENT FALLOUT SHELTER
New construction; clay masonry details.


EXHAUST VENTILATOR
INTAKE AIR FILTER (OPTIONAL)
3" STEEL PIPE
2'-0"
TOP OF EARTH COVER
2'-0"
WATERPROOF REINFORCED TILE-SLAB ROOF
#6 ROD STRAIGHT
#7 ROD BENT UP AND HOOKED, EACH JOIST, 17" O. C.
ASTM A15-, DEFORMED BARS
BRICK BEARING
10"
6"
BRICK BAFFLE WALL
BLOWER
6'-8"
8" TILE WALL
2" CONCRETE SLAB
PIPE CAP
2'-0"
1'-0"
4"x12"x12" TILE
MORTAR - ASTM C270-, TYPE S
10"x16" FOOTING
2 #4 RODS
1" SAND BED
1"
ALL CONCRETE SHALL HAVE NOT LESS THAN 5 CUBIC FEET OF CEMENT PER CUBIC YARD OF CONCRETE AND A COMPRESSIVE STRENGTH OF NOT LESS THAN 3,000 PSI.
NOTE: REMOVE PIPE CAP FOR NATURAL VENTILATION WHEN SHELTER IS NOT IN USE; REPLACE CAP WHEN BLOWER IS TO BE OPERATED.

SECTION B-B

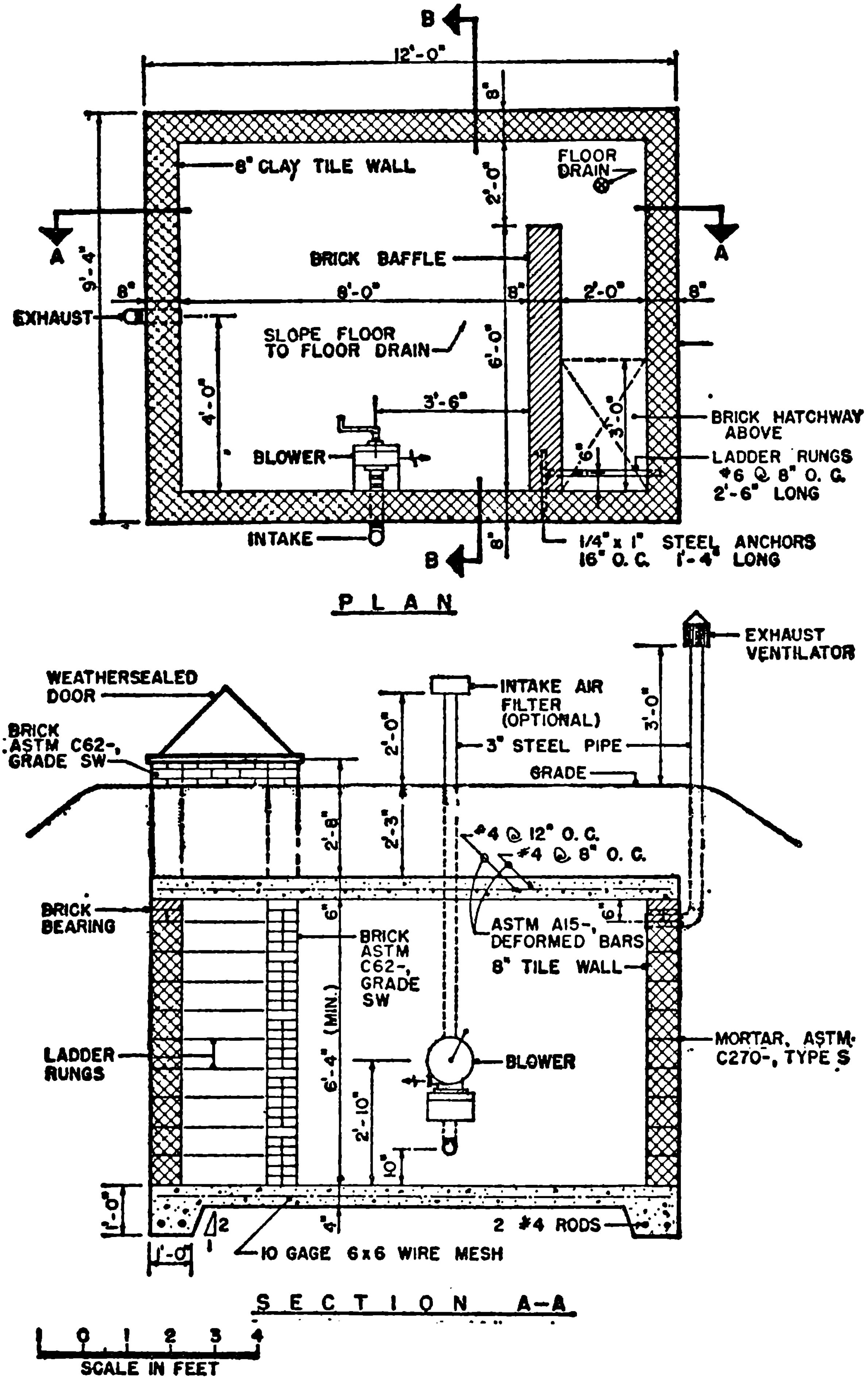

SHELTER AREA
BASEMENT AREA
STAIRS
STAIRS
BASEMENT AREA

ALTERNATE ENTRANCES TO SHELTER

ASTM A15-, DEFORMED BARS

0 1 2 3 4
SCALE IN FEET

From Plans of Structural Clay Products Institute

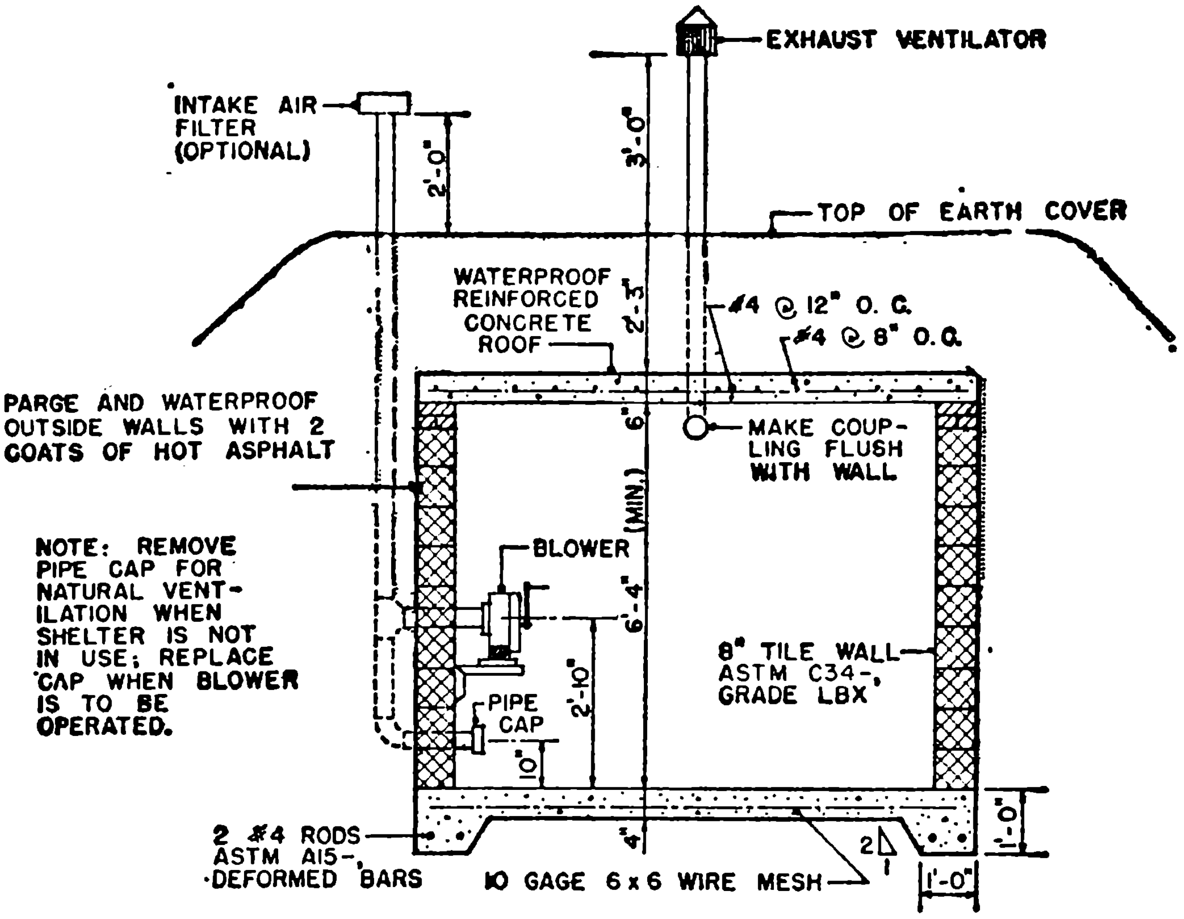


PLAN

SECTION A-A

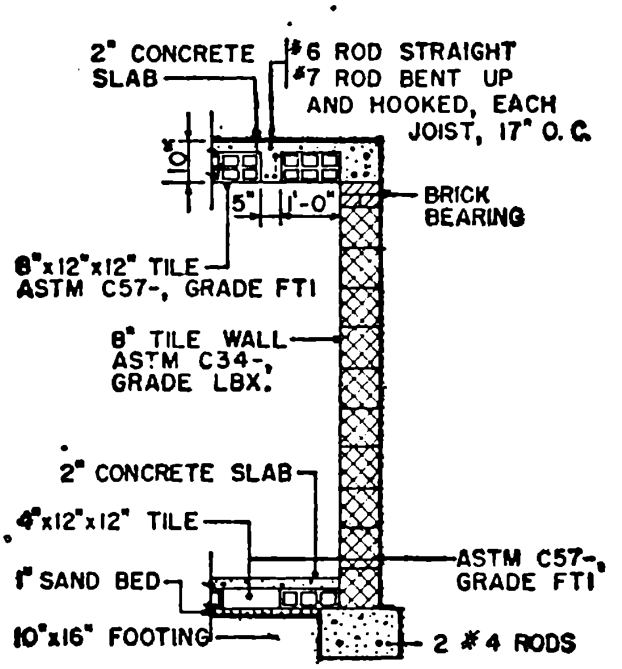
B
12'-0"
8"
8" CLAY TILE WALL
FLOOR DRAIN
2'-0"
A
A
BRICK BAFFLE
9'-4"
8"
8'-0"
8"
2'-0"
8"
EXHAUST
SLOPE FLOOR TO FLOOR DRAIN
6'-0"
4'-0"
3'-6"
3'-0"
BRICK HATCHWAY ABOVE
BLOWER
6"
LADDER RUNGS #6 @ 8" O. C. 2'-6" LONG
INTAKE
8"
B
1/4" x 1" STEEL ANCHORS 16" O. C. 1'-4" LONG
EXHAUST VENTILATOR
WEATHERSEALED DOOR
INTAKE AIR FILTER (OPTIONAL)
3'-0"
2'-0"
BRICK ASTM C62-, GRADE SW
3" STEEL PIPE
GRADE
2'-8"
2'-3"
#4 @ 12" O. C.
#4 @ 8" O. C.
BRICK BEARING
6"
6"
ASTM A15-, DEFORMED BARS
BRICK ASTM C62-, GRADE SW
8" TILE WALL
6'-4" (MIN.)
LADDER RUNGS
BLOWER
MORTAR, ASTM C270-, TYPE S
2'-10"
10"
1'-0"
2
1
4"
2 #4 RODS
1'-0"
10 GAGE 6x6 WIRE MESH
0 1 2 3 4
SCALE IN FEET

PLATE 3—UNDERGROUND FALLOUT SHELTER
New construction; clay masonry details.

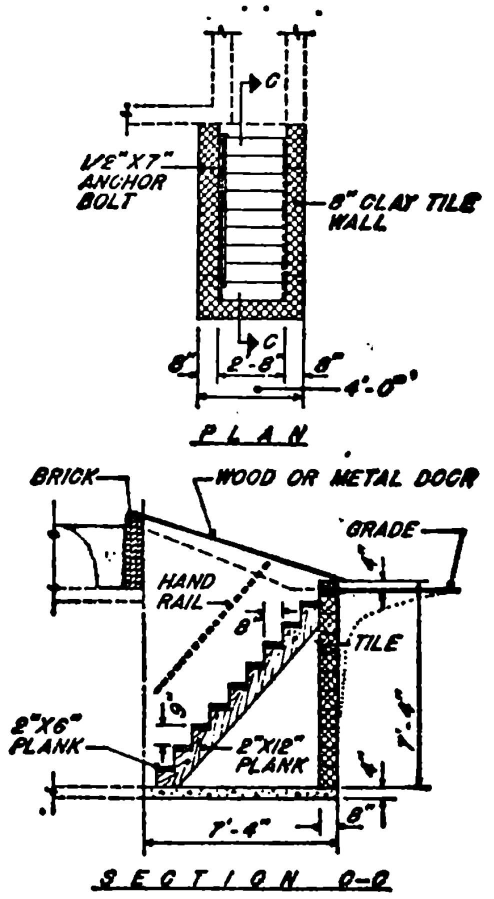

EXHAUST VENTILATOR
INTAKE AIR FILTER (OPTIONAL)
2'-0"
3'-0"
TOP OF EARTH COVER
WATERPROOF REINFORCED CONCRETE ROOF
2'-3"
#4 @ 12" O. C.
#4 @ 8" O. C.
PARGE AND WATERPROOF OUTSIDE WALLS WITH 2 COATS OF HOT ASPHALT
6'-6" (MIN.)
MAKE COUPLING FLUSH WITH WALL
NOTE: REMOVE PIPE CAP FOR NATURAL VENTILATION WHEN SHELTER IS NOT IN USE; REPLACE CAP WHEN BLOWER IS TO BE OPERATED.
BLOWER
6'-4"
2'-10"
8" TILE WALL ASTM C34-, GRADE LBX
PIPE CAP
10"
4"
1'-0"
2 #4 RODS ASTM A15-, DEFORMED BARS
10 GAGE 6 x 6 WIRE MESH
2
1
1'-0"

SECTION B-B

NOTE: ALL CONCRETE SHALL HAVE NOT LESS THAN 5 CUBIC FEET OF CEMENT PER CUBIC YARD OF CONCRETE AND A COMPRESSIVE STRENGTH OF NOT LESS THAN 3,000 PSI.


2" CONCRETE SLAB
#6 ROD STRAIGHT
#7 ROD BENT UP AND HOOKED, EACH JOIST, 17" O. C.
10"
5"
1'-0"
BRICK BEARING
8"x12"x12" TILE ASTM C57-, GRADE FT1
8" TILE WALL ASTM C34-, GRADE LBX.
2" CONCRETE SLAB
4"x12"x12" TILE
1" SAND BED
10"x16" FOOTING
ASTM C57-, GRADE FT1
2 #4 RODS

ALTERNATE SECTION A-A

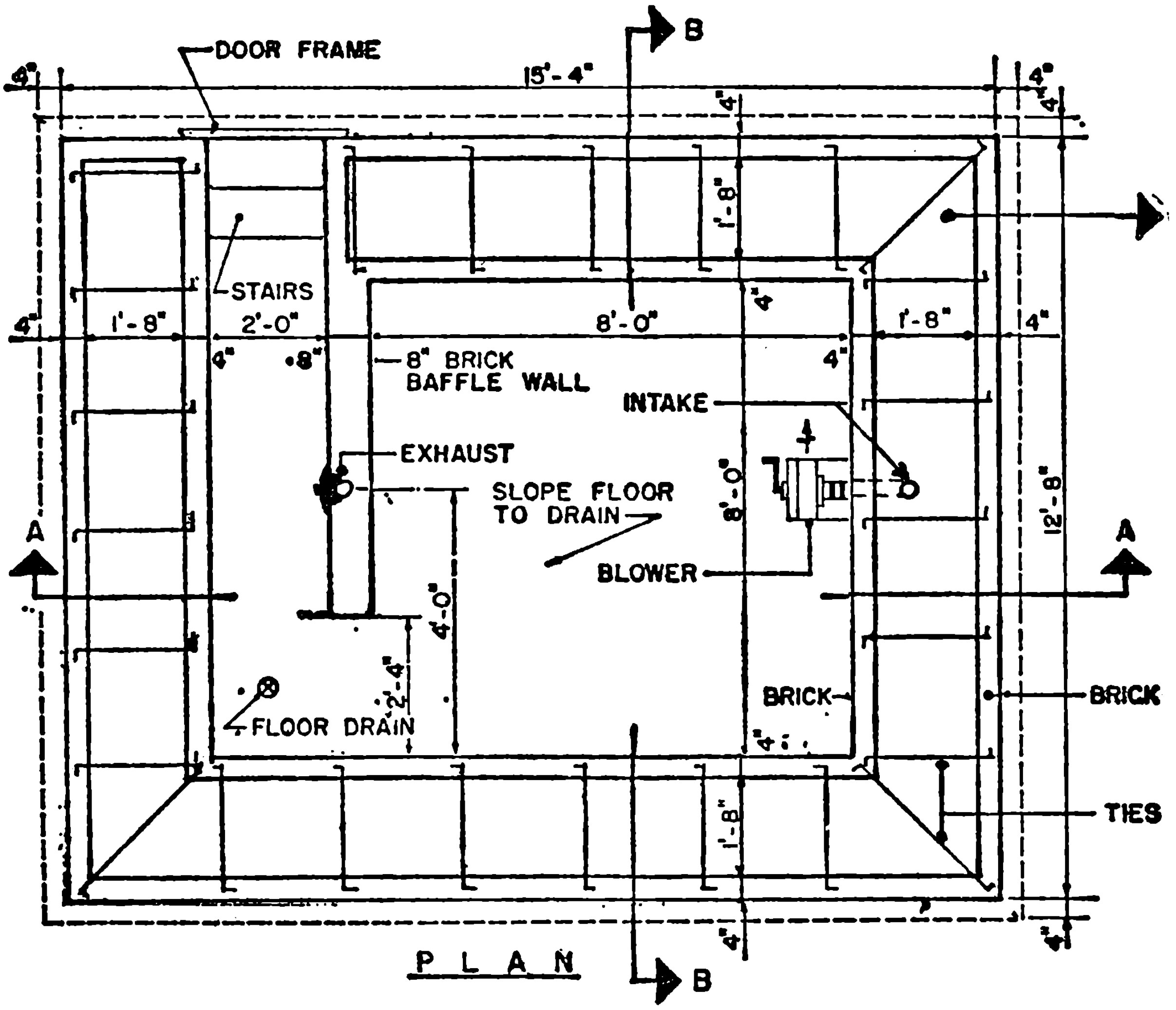

C
1/2"X7" ANCHOR BOLT
8" CLAY TILE WALL
C
8"
2'-8"
8"
4'-0"
BRICK
WOOD OR METAL DOOR
GRADE
HAND RAIL
8"
TILE
9"
7'-4"
2"X6" PLANK
2"X12" PLANK
7'-4"
8"

PLAN

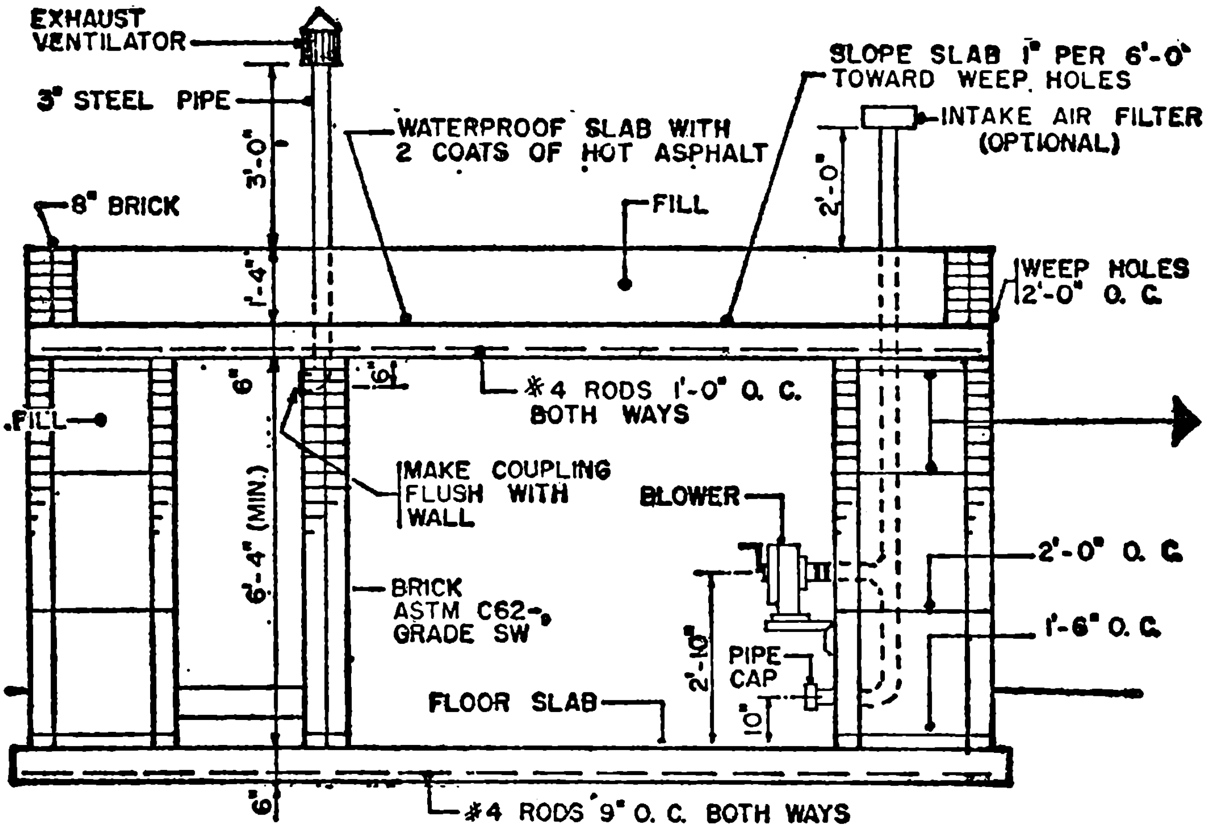
SECTION C-C

ALTERNATE ENTRANCE DETAILS

From Plans of Structural Clay Products Institute

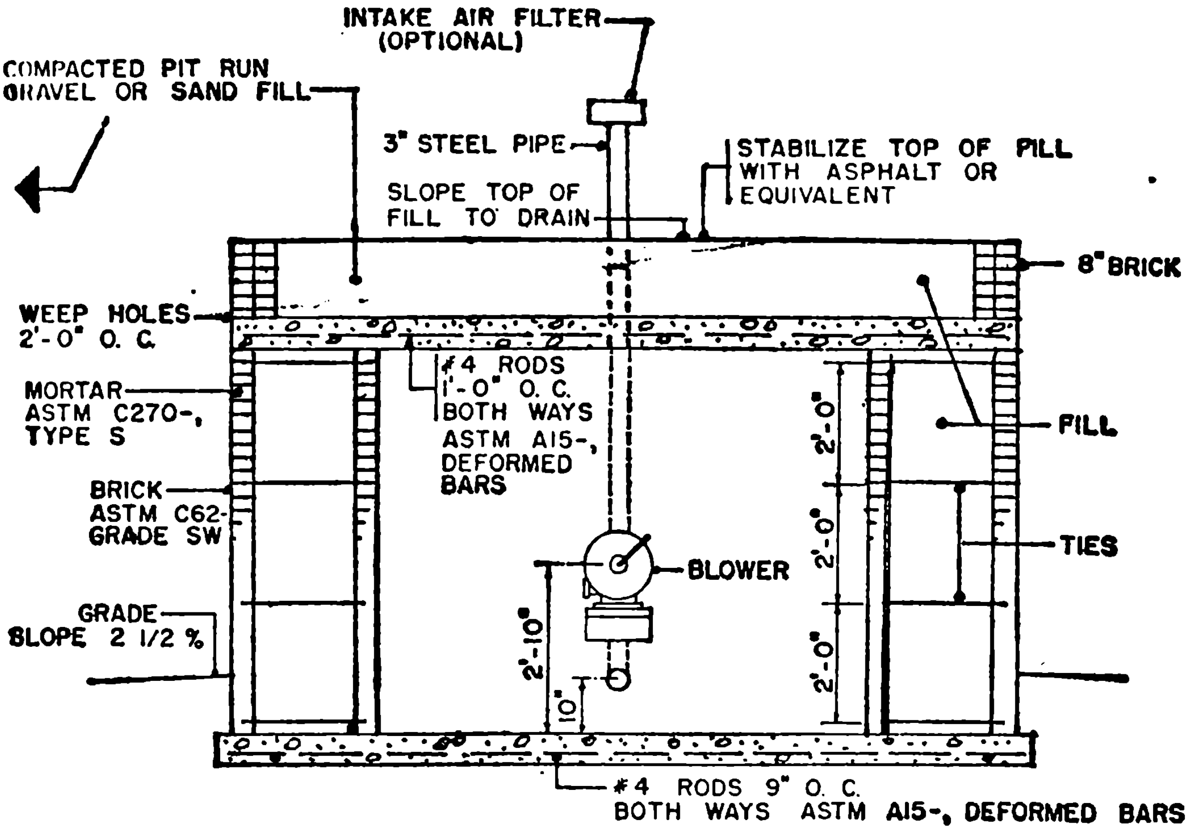

DOOR FRAME
B
4"
15'-4"
4"
4"
4"
1'-8"
STAIRS
4"
1'-8"
2'-0"
8'-0"
1'-8"
4"
4"
8"
8" BRICK BAFFLE WALL
4"
INTAKE
EXHAUST
SLOPE FLOOR TO DRAIN
8'-0"
12'-8"
A
A
BLOWER
4'-0"
2'-4"
FLOOR DRAIN
BRICK
BRICK
4"
TIES
1'-8"
4"
4"
B

P L A N

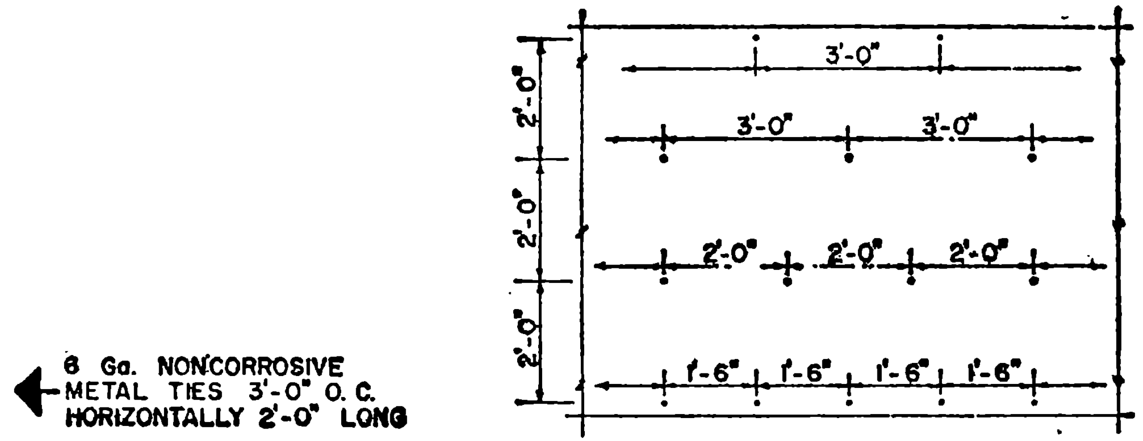

EXHAUST VENTILATOR
3" STEEL PIPE
3'-0"
WATERPROOF SLAB WITH 2 COATS OF HOT ASPHALT
SLOPE SLAB 1" PER 6'-0" TOWARD WEEP HOLES
INTAKE AIR FILTER (OPTIONAL)
2'-0"
8" BRICK
FILL
1'-4"
WEEP HOLES 2'-0" O. C.
FILL
6"
6"
#4 RODS 1'-0" O. C. BOTH WAYS
MAKE COUPLING FLUSH WITH WALL
BLOWER
6'-4" (MIN.)
2'-0" O. C.
BRICK ASTM C62-, GRADE SW
1'-6" O. C.
2'-10"
PIPE CAP
FLOOR SLAB
10"
6"
#4 RODS 9" O. C. BOTH WAYS

S E C T I O N A—A

PLATE 4—ABOVEGROUND FALLOUT SHELTER
New construction; clay masonry details.


INTAKE AIR FILTER (OPTIONAL)
COMPACTED PIT RUN GRAVEL OR SAND FILL
3" STEEL PIPE
SLOPE TOP OF FILL TO DRAIN
STABILIZE TOP OF FILL WITH ASPHALT OR EQUIVALENT
8" BRICK
WEEP HOLES 2'-0" O. C.
#4 RODS 1'-0" O. C. BOTH WAYS ASTM A15-, DEFORMED BARS
MORTAR ASTM C270-, TYPE S
FILL
BRICK ASTM C62-GRADE SW
TIES
BLOWER
2'-0"
2'-0"
2'-0"
2'-10"
10"
GRADE SLOPE 2 1/2 %
#4 RODS 9" O. C. BOTH WAYS ASTM A15-, DEFORMED BARS

SECTION B-B

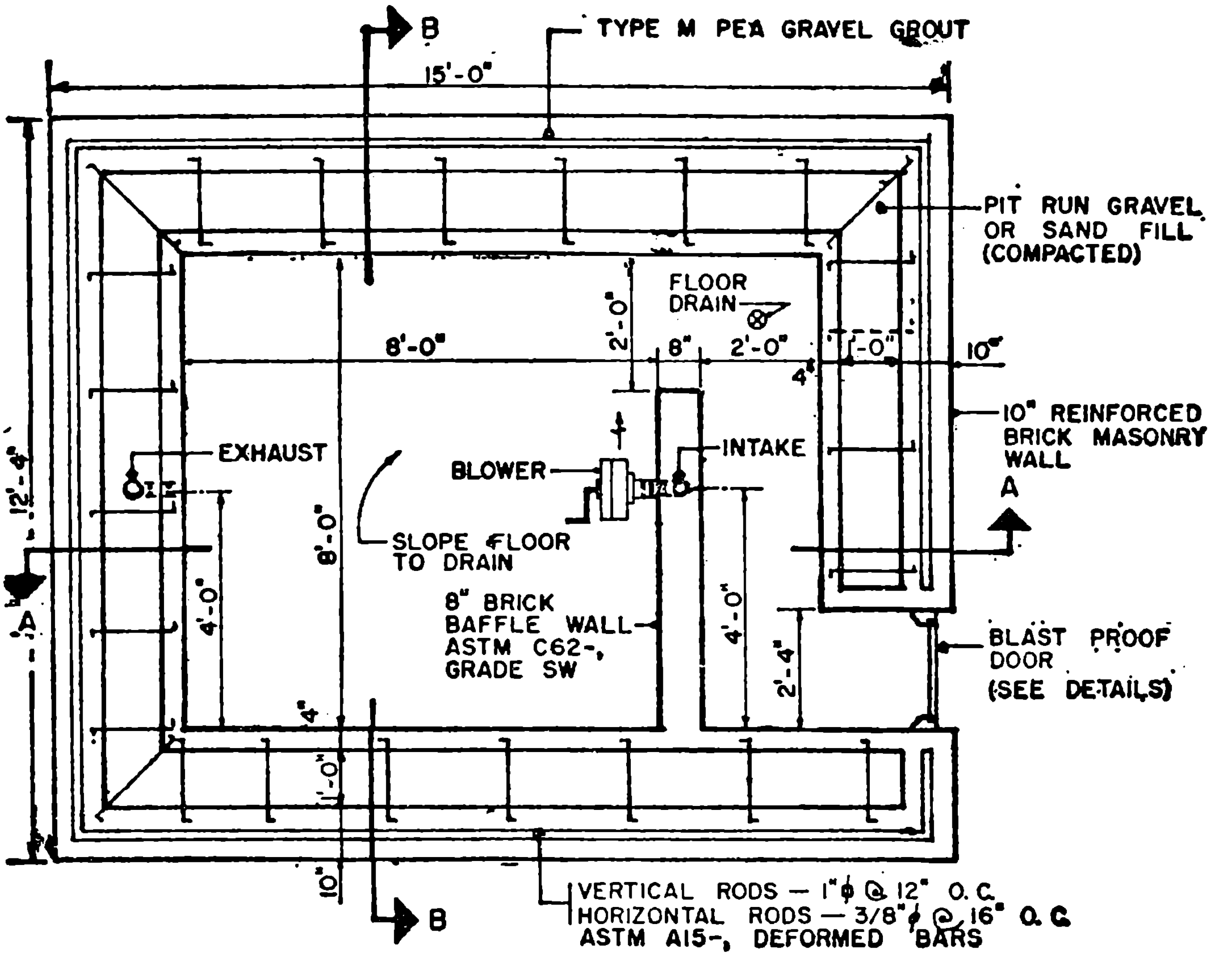

3'-0"
3'-0"
3'-0"
2'-0"
2'-0"
2'-0"
1'-6"
1'-6"
1'-6"
1'-6"
2'-0"
2'-0"
2'-0"
6 Ga. NONCORROSIVE METAL TIES 3'-0" O. C. HORIZONTALLY 2'-0" LONG

TIE LOCATIONS

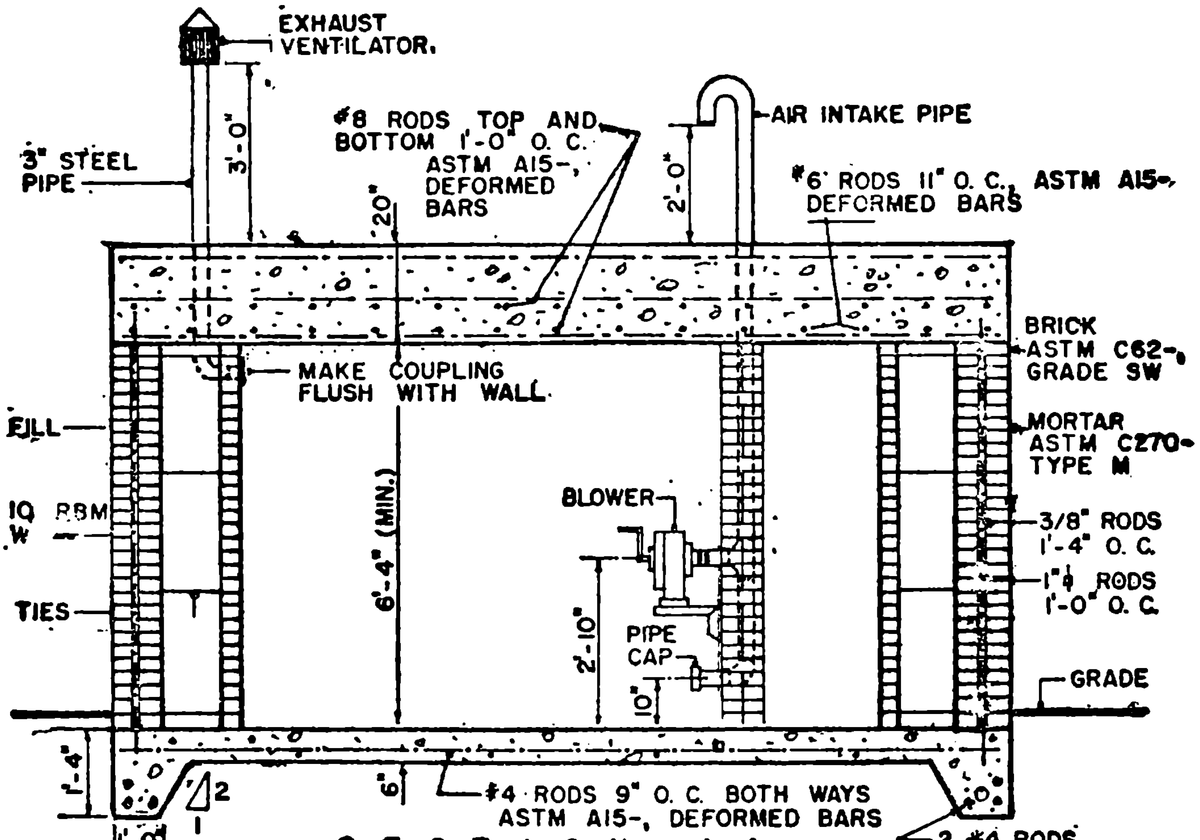
NOTE: ALL CONCRETE SHALL HAVE NOT LESS THAN 5 CUBIC FEET OF CEMENT PER CUBIC YARD OF CONCRETE AND A COMPRESSIVE STRENGTH OF NOT LESS THAN 3,000 PSI.

1 0 1 2 3 4
SCALE IN FEET

From Plans of Structural Clay Products Institute


B
TYPE M PEA GRAVEL GROUT
15'-0"
PIT RUN GRAVEL OR SAND FILL (COMPACTED)
FLOOR DRAIN
2'-0"
8'-0"
8"
2'-0"
1'-0"
10"
4"
10" REINFORCED BRICK MASONRY WALL
A
EXHAUST
BLOWER
INTAKE
12'-4"
A
8'-0"
SLOPE FLOOR TO DRAIN
8" BRICK BAFFLE WALL ASTM C62-, GRADE SW
4'-0"
4'-0"
2'-4"
BLAST PROOF DOOR (SEE DETAILS)
4"
1'-0"
10"
B
VERTICAL RODS — 1"ϕ @ 12" O. C.
HORIZONTAL RODS — 3/8"ϕ @ 16" O. C.
ASTM A15-, DEFORMED BARS

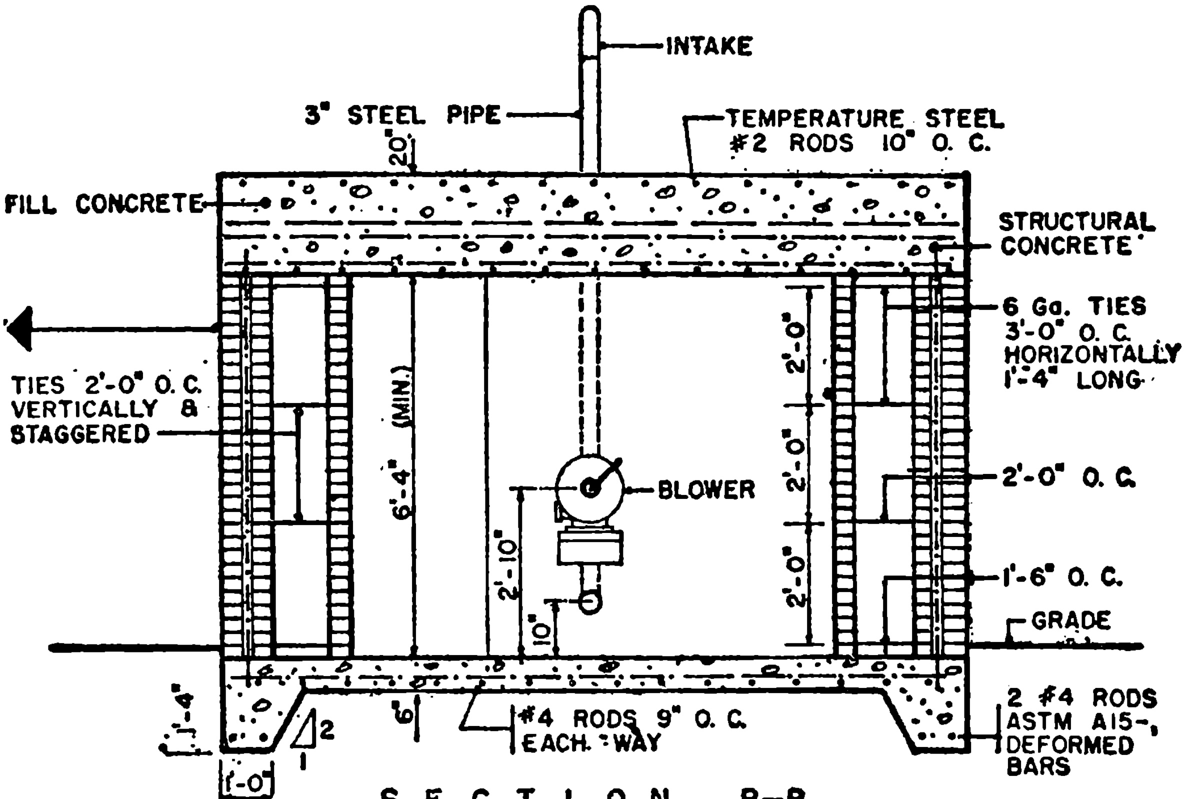
P L A N


EXHAUST VENTILATOR.
3'-0"
3" STEEL PIPE
#8 RODS TOP AND BOTTOM 1'-0" O. C. ASTM A15-, DEFORMED BARS
.20'
2'-0"
AIR INTAKE PIPE
#6 RODS 11" O. C., ASTM A15-, DEFORMED BARS
MAKE COUPLING FLUSH WITH WALL
BRICK ASTM C62-, GRADE SW
MORTAR ASTM C270- TYPE M
FILL
10 RBM W
TIES
6'-4" (MIN.)
BLOWER
PIPE CAP
2'-10"
10"
3/8" RODS 1'-4" O. C.
1"ϕ RODS 1'-0" O. C.
GRADE
1'-4"
2
1
1'-0"
6"
#4 RODS 9" O. C. BOTH WAYS ASTM A15-, DEFORMED BARS
2 #4 RODS

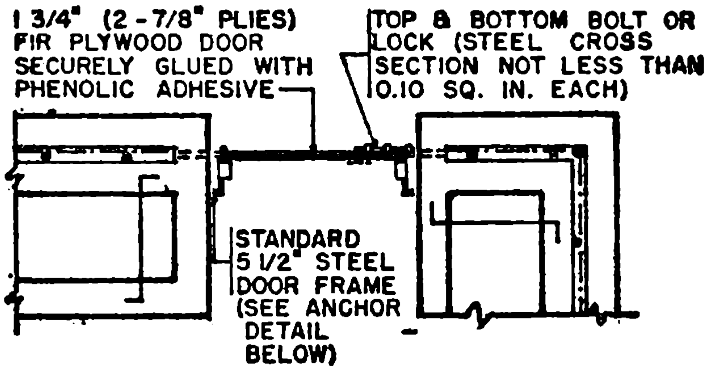
S E C T I O N A—A

PLATE 5—ABOVEGROUND BLAST AND FALLOUT SHELTER
New construction; clay masonry details.

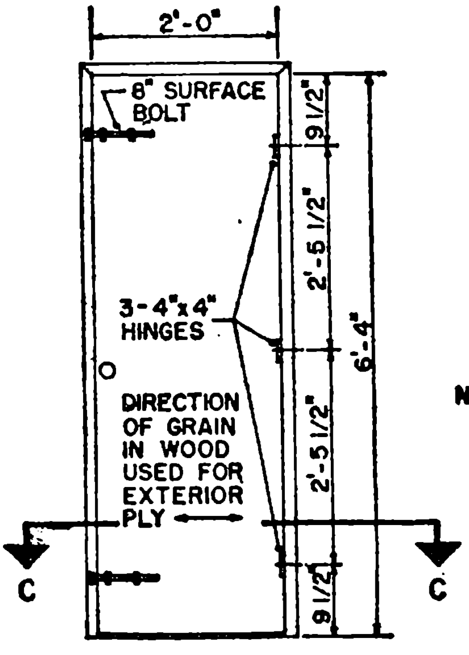
NOTE: LOCATION OF INTAKE AND EXHAUST CAN BE REVERSED, EXHAUSTING AIR FROM ENTANCE SIDE OF BAFFLE WALL.


INTAKE
3" STEEL PIPE
20"
TEMPERATURE STEEL
#2 RODS 10" O. C.
FILL CONCRETE
STRUCTURAL CONCRETE
6 Ga. TIES
3'-0" O. C.
HORIZONTALLY
1'-4" LONG
TIES 2'-0" O. C.
VERTICALLY &
STAGGERED
6'-4" (MIN.)
BLOWER
2'-10"
10"
2'-0"
2'-0"
2'-0"
2'-0" O. C.
1'-6" O. C.
GRADE
1'-4"
6"
#4 RODS 9" O. C.
EACH WAY
2 #4 RODS
ASTM A15-,
DEFORMED
BARS
2
1
1'-0"

SECTION B-B

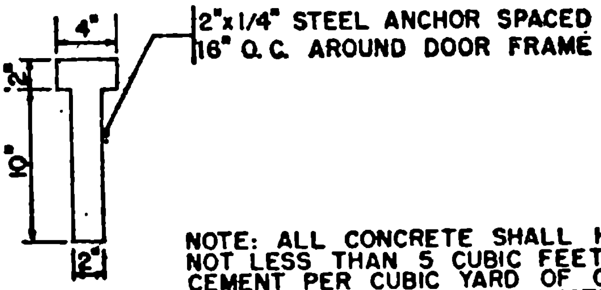

1 3/4" (2-7/8" PLIES) FIR PLYWOOD DOOR SECURELY GLUED WITH PHENOLIC ADHESIVE
TOP & BOTTOM BOLT OR LOCK (STEEL CROSS SECTION NOT LESS THAN 0.10 SQ. IN. EACH)
STANDARD 5 1/2" STEEL DOOR FRAME (SEE ANCHOR DETAIL BELOW)

SECTION C-C

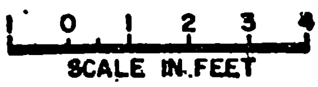

2'-0"
8" SURFACE BOLT
9 1/2"
2'-5 1/2"
2'-5 1/2"
9 1/2"
6'-4"
3-4"x4" HINGES
DIRECTION OF GRAIN IN WOOD USED FOR EXTERIOR PLY
C
C

DOOR ELEVATION

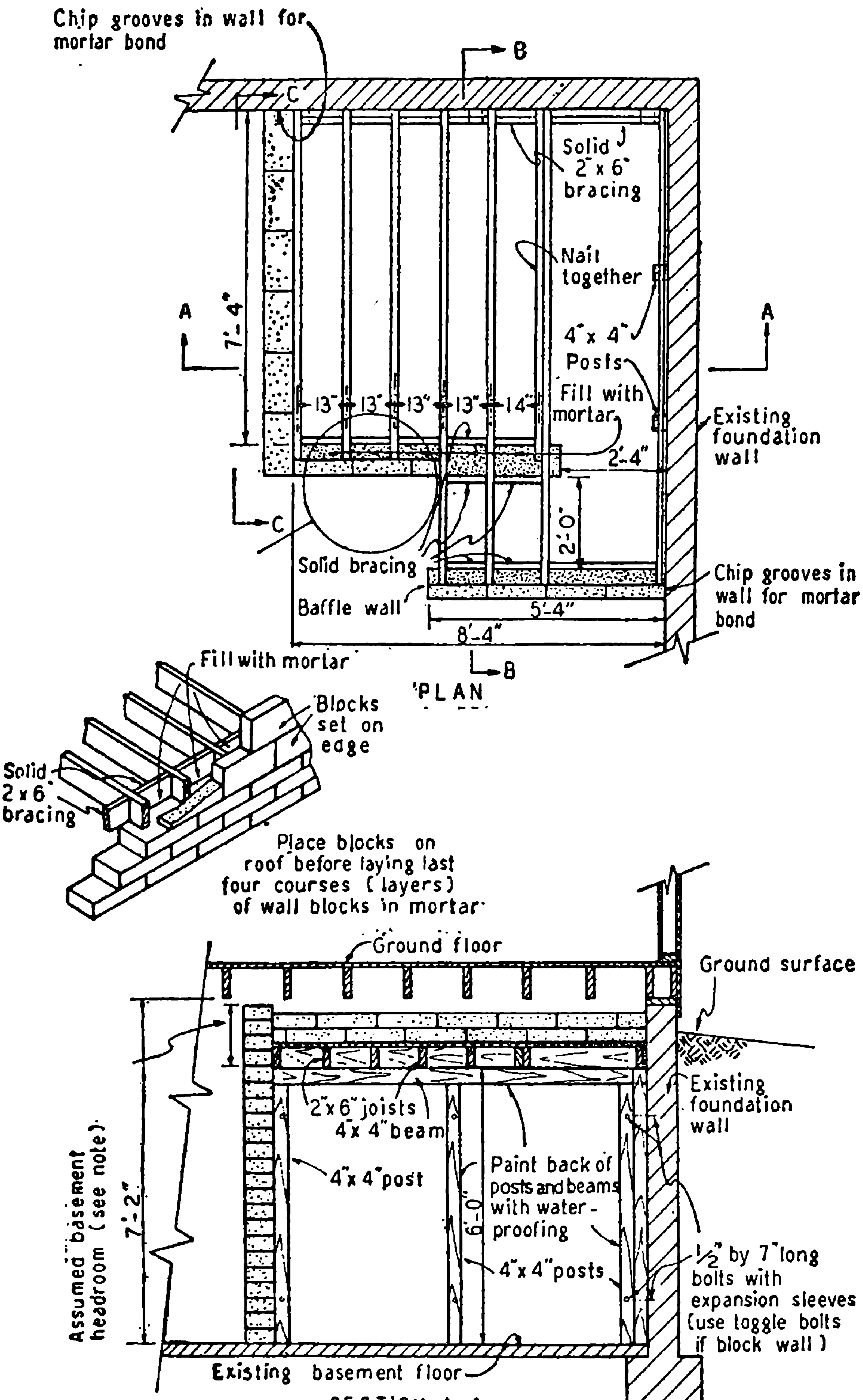
NOTE: USE AT LEAST 4-1 1/2" #9 SCREWS IN EACH HINGE AND BOLT.


4"
2"x1/4" STEEL ANCHOR SPACED 16" O.C. AROUND DOOR FRAME
2"
10"
2"

NOTE: ALL CONCRETE SHALL HAVE NOT LESS THAN 5 CUBIC FEET OF CEMENT PER CUBIC YARD OF CONCRETE AND A COMPRESSIVE STRENGTH OF NOT LESS THAN 3,000 PSI.


1 0 1 2 3 4
SCALE IN FEET

From Plans of Structural Clay Products Institute

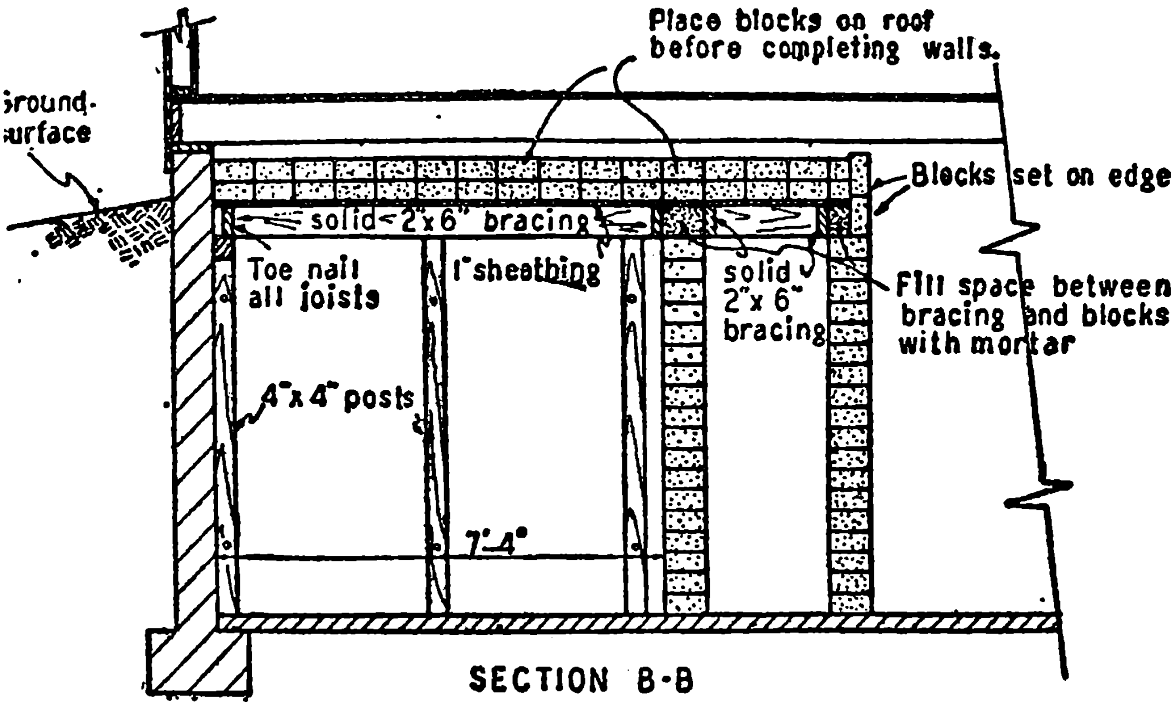

Chip grooves in wall for mortar bond
B
C
Solid 2" x 6" bracing
Nail together
4" x 4" Posts
Fill with mortar
A
A
7'-4"
13" 13" 13" 13" 14"
2'-4"
Existing foundation wall
C
2'-0"
Solid bracing
Baffle wall
5'-4"
8'-4"
Chip grooves in wall for mortar bond
B
Fill with mortar
Blocks set on edge
Solid 2 x 6 bracing
Place blocks on roof before laying last four courses (layers) of wall blocks in mortar
Ground floor
Ground surface
Existing foundation wall
2" x 6" joists
4" x 4" beam
4" x 4" post
Paint back of posts and beams with water-proofing
6'-0"
4" x 4" posts
½" by 7" long bolts with expansion sleeves (use toggle bolts if block wall)
Assumed basement headroom (see note)
7'-2"
Existing basement floor

PLAN

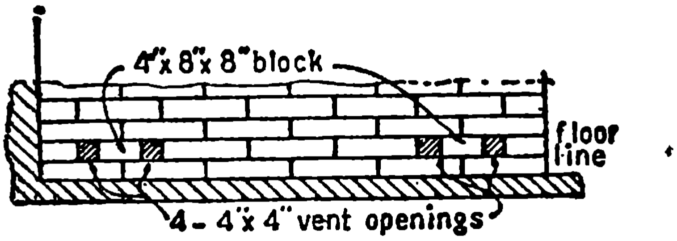
SECTION A·A

PLATE 6—BASEMENT FALLOUT SHELTER

6 persons; existing construction; concrete block.


Place blocks on roof before completing walls.
round-
urface
Blocks set on edge
solid 2"x 6" bracing
Toe nail all joists
1" sheathing
solid 2"x 6" bracing
Fill space between bracing and blocks with mortar
4"x 4" posts
7'-4"

SECTION B-B


4"x 8"x 8" block
floor line
4 - 4"x 4" vent openings

SECTION C-C

Notes;

Dimension lumber-fir-construction grade no. 1 or better, pine grade no. 1 or better.

In tornado areas, space ceiling joists a maximum of 10 inches on center instead of 13 inches as shown, and use a 4"x 6" (6" side vertically) along wall instead of the 4"x 4" shown.

For basement headrooms, other than that assumed, adjust shelter height as necessary.

In earthquake areas consult your local code and a competent engineer for additional strengthening required.

Bill of materials;

Blocks..	475 - 4"x8"x16" (solid concrete)
	60 - 4"x8"x8" (solid concrete)
Mortar...	8 - bags - 1 cu. ft. each (ready mix)
Posts....	3 - 4"x 4"x 5'-8"
	2 - 4"x4"x 6' 0"
Beam....	1 - 4"x 4"x 8'-4"
Joists....	4 - 2"x 6"x 10'-4"
	4 - 2"x 6"x 7'-8"
Sheathing -	95 board feet of 1" material
Bolts....	10 - ½" dia. x 7" with expansion sleeves if concrete wall or with toggle bolts if block wall
Nails....	3 pounds 16 penny
	3 pounds 6 penny

1 0 1 2 3

SCALE IN FEET

From Plans of Office of Civil and Defense Mobilization

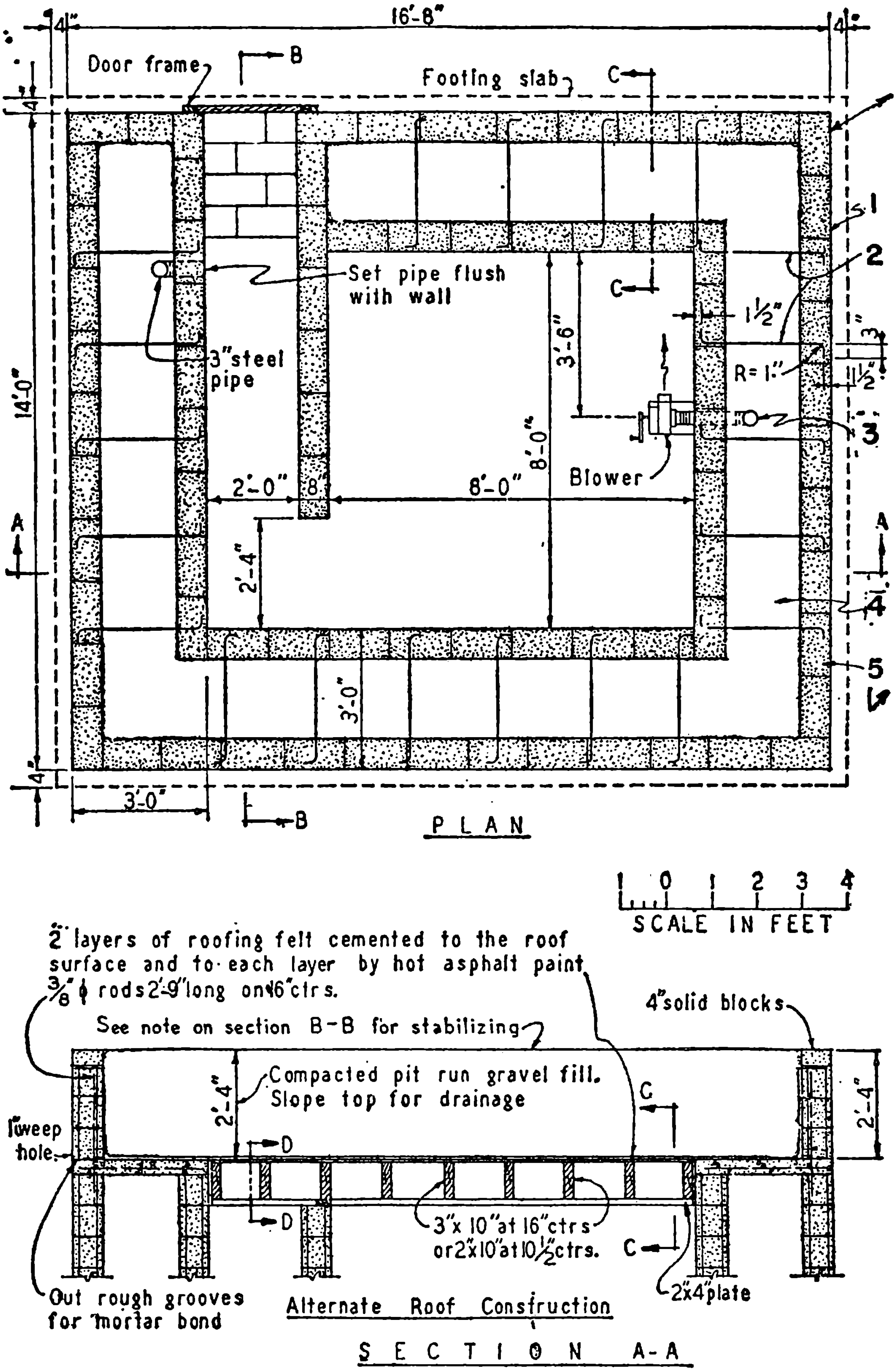
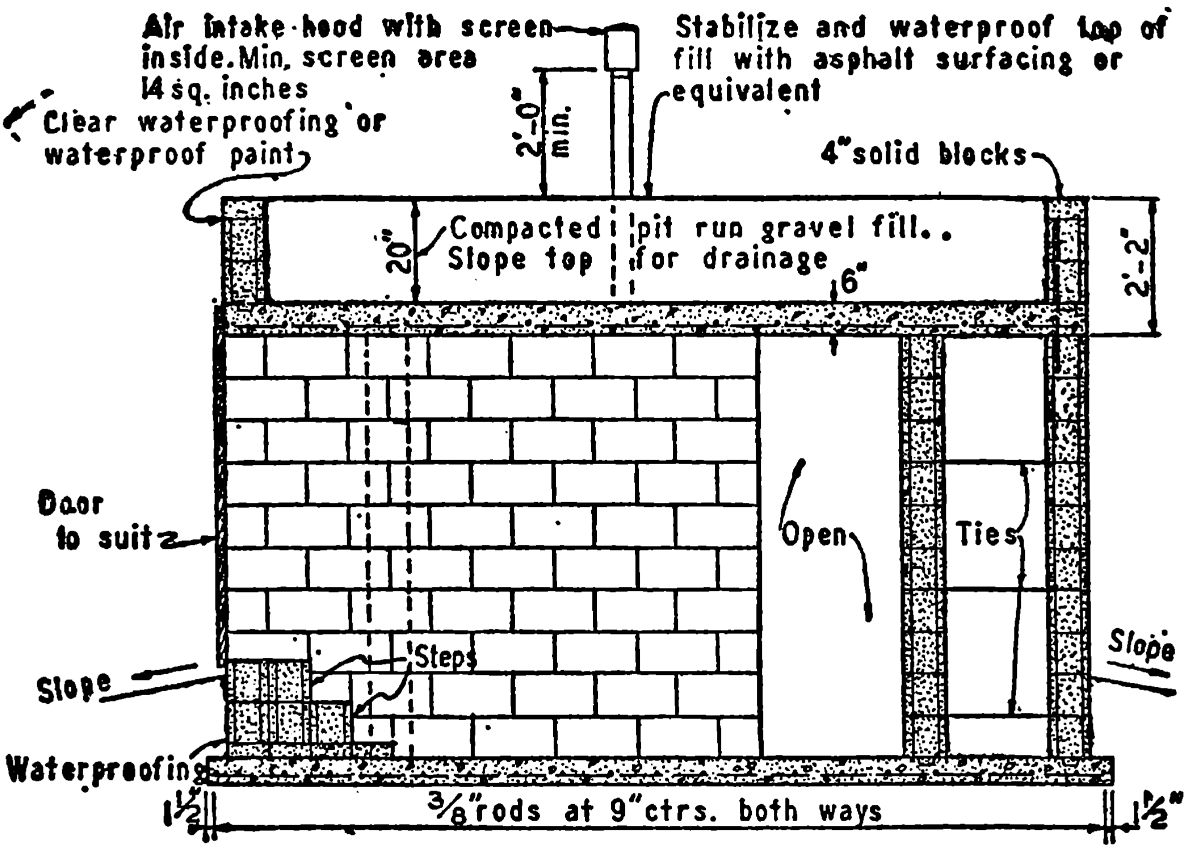
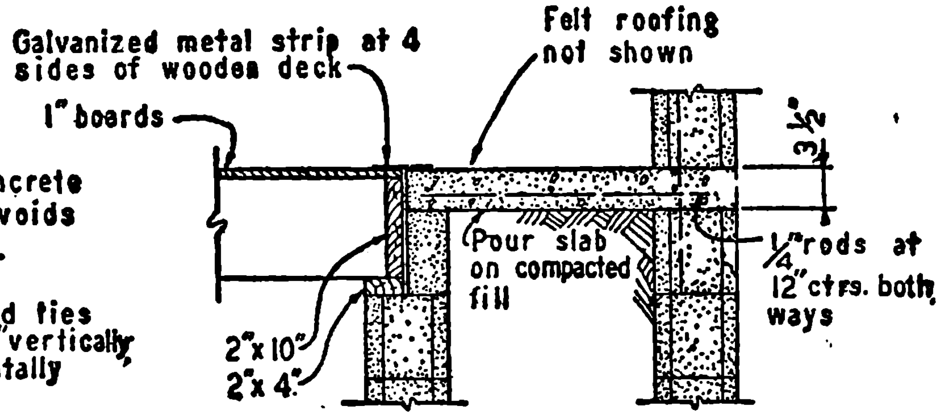

4"
16'-8"
4"
Door frame
B
Footing slab
C
1
2
Set pipe flush with wall
C
1½"
3"
3'-6"
3"steel pipe
R= 1."
1½"
14'-0"
3
8'-0"
Blower
2'-0"
8"
8'-0"
A
A
2'-4"
4
5
3'-0"
4"
3'-0"
B
PLAN
1 0 1 2 3 4
SCALE IN FEET
2 layers of roofing felt cemented to the roof surface and to each layer by hot asphalt paint
3/8" ϕ rods 2'-9" long on 16" ctrs.
See note on section B-B for stabilizing
4"solid blocks
Compacted pit run gravel fill. Slope top for drainage
2'-4"
2'-4"
C
1" weep hole
D
D
3"x 10" at 16" ctrs or 2"x10" at 10½" ctrs.
C
Cut rough grooves for mortar bond
Alternate Roof Construction
2"x4" plate
SECTION A-A

PLATE 7—ABOVEGROUND FALLOUT SHELTER
6 persons; new construction; concrete.


Air intake hood with screen inside. Min. screen area 14 sq. inches
2'-0" min.
Stabilize and waterproof top of fill with asphalt surfacing or equivalent
Clear waterproofing or waterproof paint
4" solid blocks
20"
Compacted pit run gravel fill. Slope top for drainage
6"
2'-2"
Door to suit
Open
Ties
Steps
Slope
Slope
Waterproofing
1½"
⅜" rods at 9" ctrs. both ways
1½"

SECTION B-B


Galvanized metal strip at 4 sides of wooden deck
Felt roofing not shown
1" boards
3½"
Pour slab on compacted fill
¼" rods at 12" ctrs. both ways
2"x 10"
2"x 4"

SECTION C-C

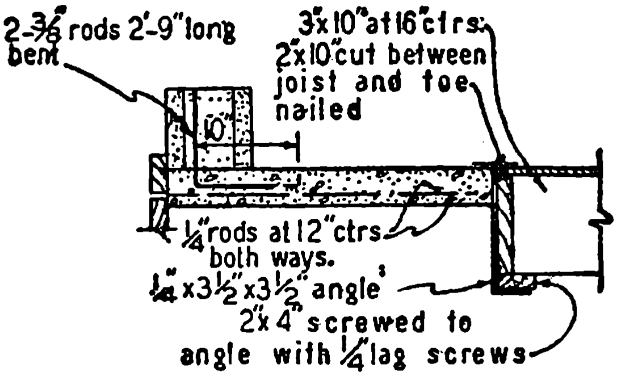
1 8" hollow concrete blocks. Fill voids with mortar.

2 ¼" galvanized ties spaced 2'-0" vertically and horizontally

3 3" steel pipe

4 Compacted pit run gravel or earth fill

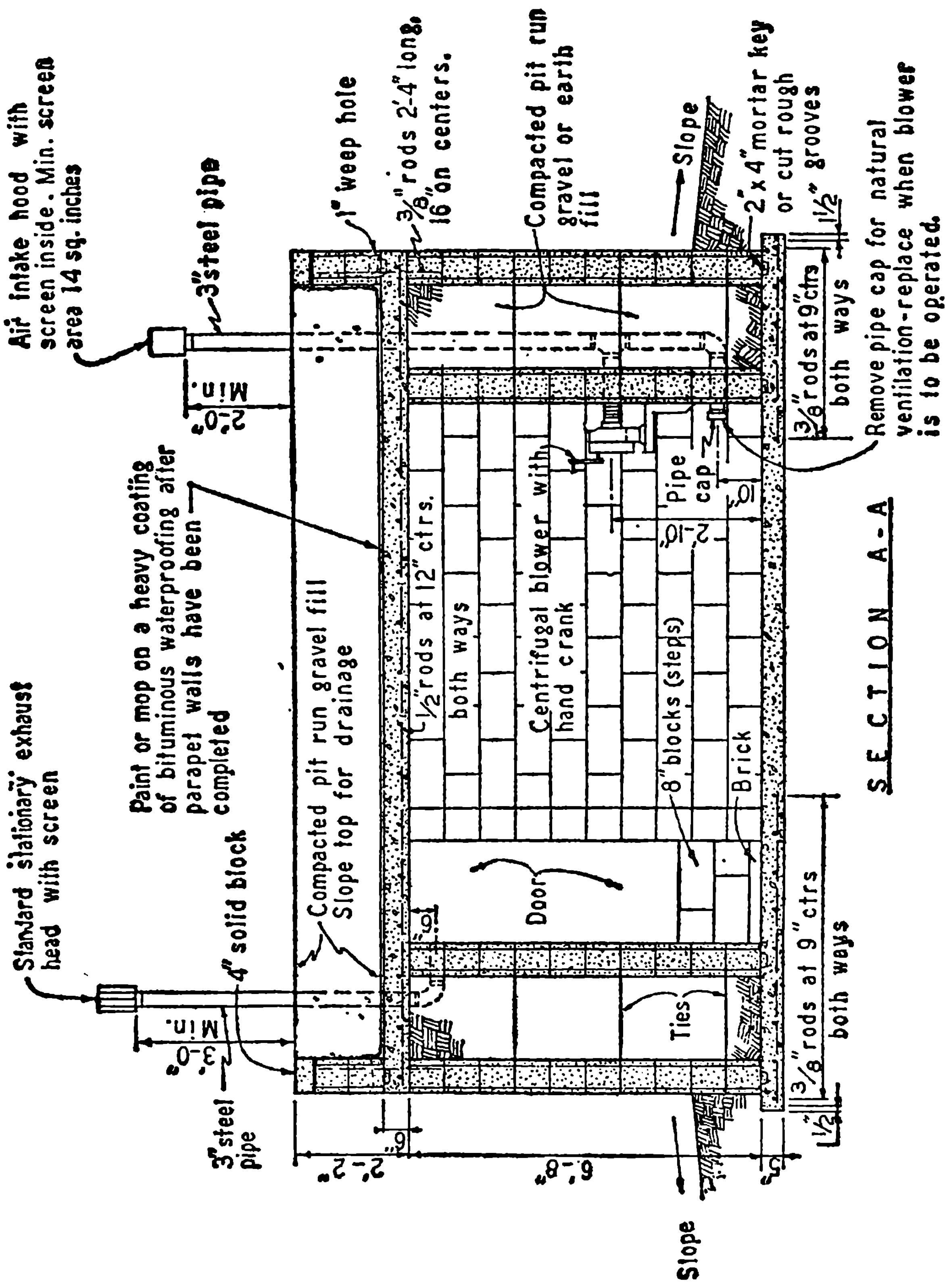
5 Holes in blocks not shown


2-⅜" rods 2'-9" long bent
3"x10" at 16" ctrs. 2"x10" cut between joist and toe-nailed
10"
¼" rods at 12" ctrs. both ways.
¼" x3½"x3½" angle
2"x 4" screwed to angle with ¼" lag screws

SECTION D-D

SCALE IN FEET
For section D-D and C-C

From Plans of Office of Civil and Defense Mobilization


Air intake hood with screen inside. Min. screen area 14 sq. inches
3" steel pipe
2'-0" Min.
1" weep hole
3/8" rods 2'-4" long, 16" on centers.
Compacted pit run gravel or earth fill
Slope
2" x 4" mortar key or cut rough 1 1/2" grooves
3/8" rods at 9" ctrs both ways
1 1/2"
Remove pipe cap for natural ventilation - replace when blower is to be operated.
Paint or mop on a heavy coating of bituminous waterproofing after parapet walls have been completed
Pipe cap
2'-10"
10"
1/2" rods at 12" ctrs. both ways
Centrifugal blower with hand crank
8" blocks (steps)
Brick
SECTION A-A
Standard stationary exhaust head with screen
4" solid block
Compacted pit run gravel fill Slope top for drainage
3'-0" Min.
3" steel pipe
Door
9"
Ties
3/8" rods at 9" ctrs both ways
1 1/2"
2'-2"
9"
6'-8"
5"
Slope

From Plans of Office of
Civil and Defense Mobilization

1 0 1 2 3 4
SCALE IN FEET

PLATE 8—ABOVEGROUND FALLOUT SHELTER
Additional details. (See Plate 7).

NOTES;

16–4″x8″x16″ and 16–4″x8″x8″ solid blocks must be provided for 8″ thick wall to be laid up without mortar across the doorway after shelter is occupied.

Solid concrete blocks or brick may be used.

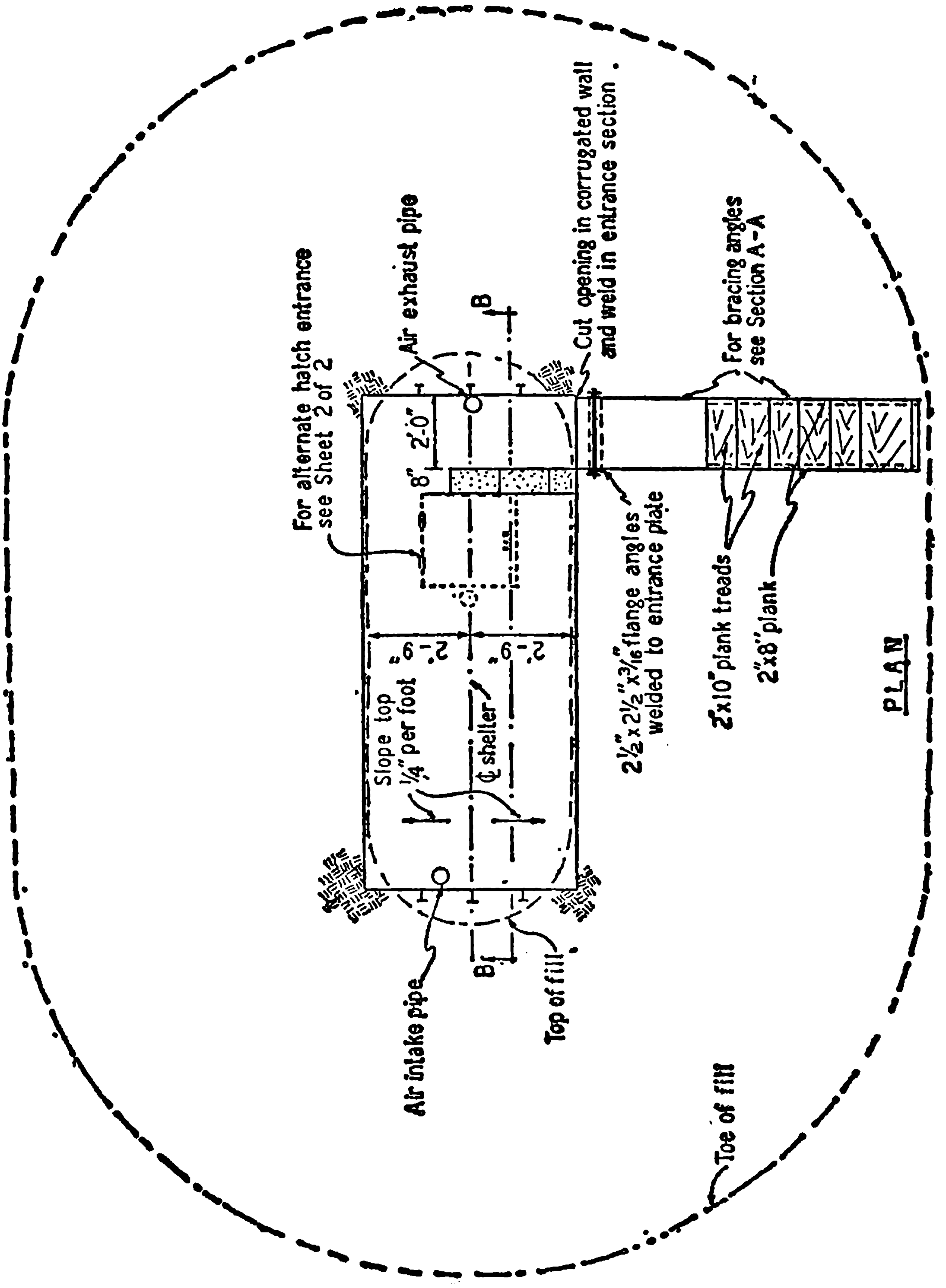
If brick is used for walls fill must be 6″ thicker.

Build walls in 2′-0″ lifts (heights) or less. Let mortar harden for each lift.

Then compact the earth fill thoroughly in 4″ layers. Compaction to be done carefully so as not to break the mortar bond.

Protect the compacted soil from water for each lift.

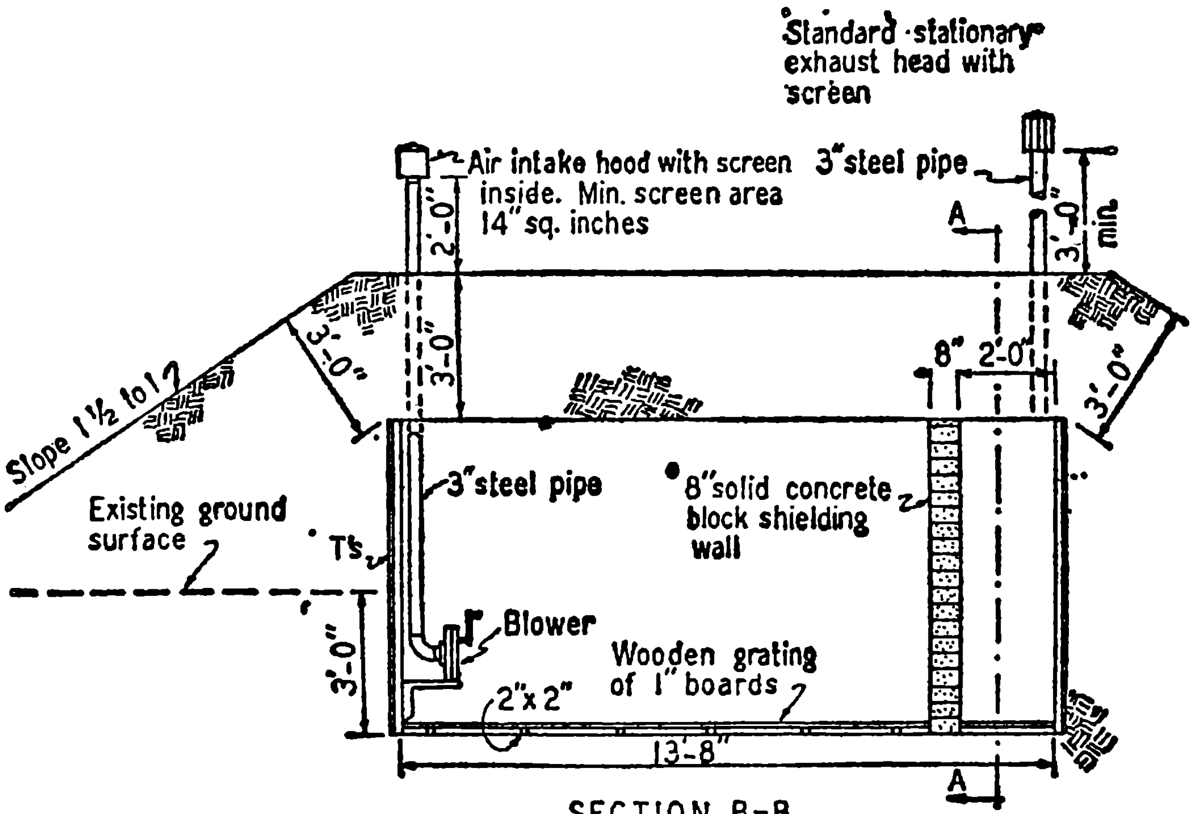
Gravel may be compacted in 8″ layers.


For alternate hatch entrance see Sheet 2 of 2
Air exhaust pipe
B
Cut opening in corrugated wall and weld in entrance section
For bracing angles see Section A-A
2'-0"
8"
2'-9"
2'-9"
Slope top 1/4" per foot
℄ shelter
2½"x2½"x3/16" flange angles welded to entrance plate
2"x10" plank treads
2"x8" plank
PLAN
Air intake pipe
B
Top of fill
Toe of fill
1 0 1 2 3 4 5
SCALE IN FEET

This shelter may be placed completely underground or at any level to suit, maintaining 3'-0" cover

PLATE 9—UNDERGROUND FALLOUT SHELTER

6 persons; pre-shaped metal; stairway entrance.

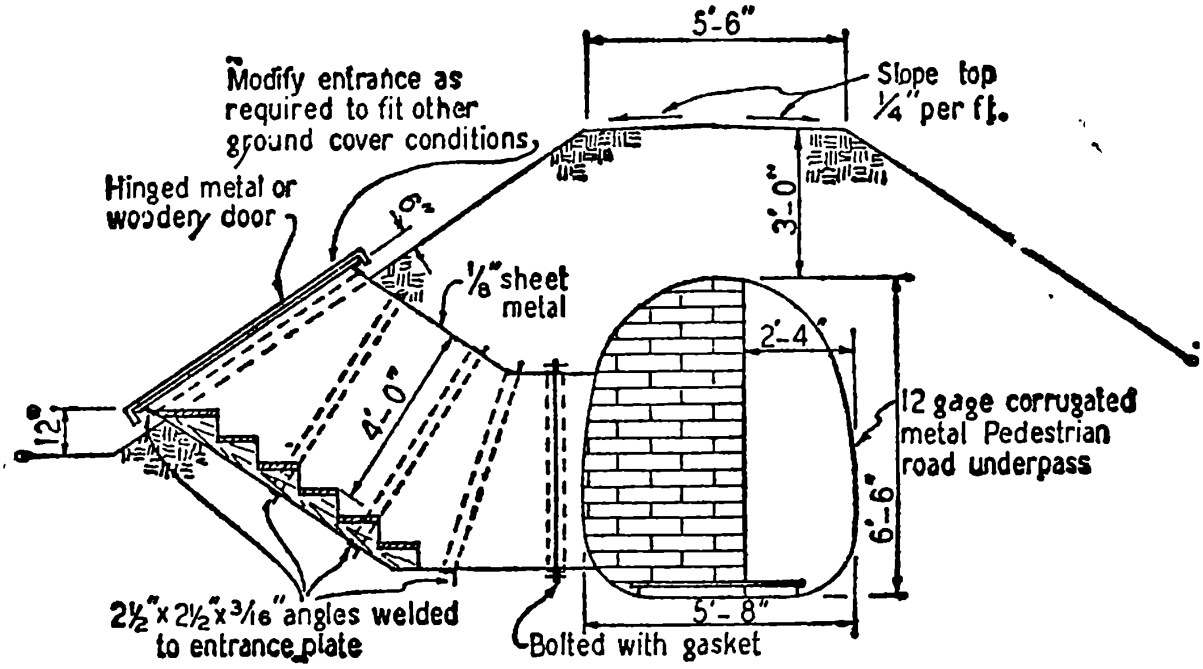

Standard stationary exhaust head with screen
Air intake hood with screen inside. Min. screen area 14" sq. inches
3"steel pipe
2'-0"
3'-0" min.
A
Slope 1½ to 1
3'-0"
3'-0"
3'-0"
8" 2'-0"
3"steel pipe
8"solid concrete block shielding wall
Existing ground surface
T's
Blower
Wooden grating of 1" boards
2"x 2"
3'-0"
13'-8"
A

SECTION B-B

Note: If the ground water level is 6'-0" or more above the bottom of the shelter, additional weight must be added to prevent shelter from floating

For end closure see Section C-C

Coat entire outer and inner surface of shelter with rust preventive paint


5'-6"
Slope top ¼"per ft.
Modify entrance as required to fit other ground cover conditions
Hinged metal or wooden door
6"
⅛"sheet metal
3'-0"
2'-4"
4'-0"
12"
12 gage corrugated metal Pedestrian road underpass
6'-6"
2½"x 2½"x 3/16"angles welded to entrance plate
5'-8"
Bolted with gasket

SECTION A-A

From Plans of Office of Civil and Defense Mobilization

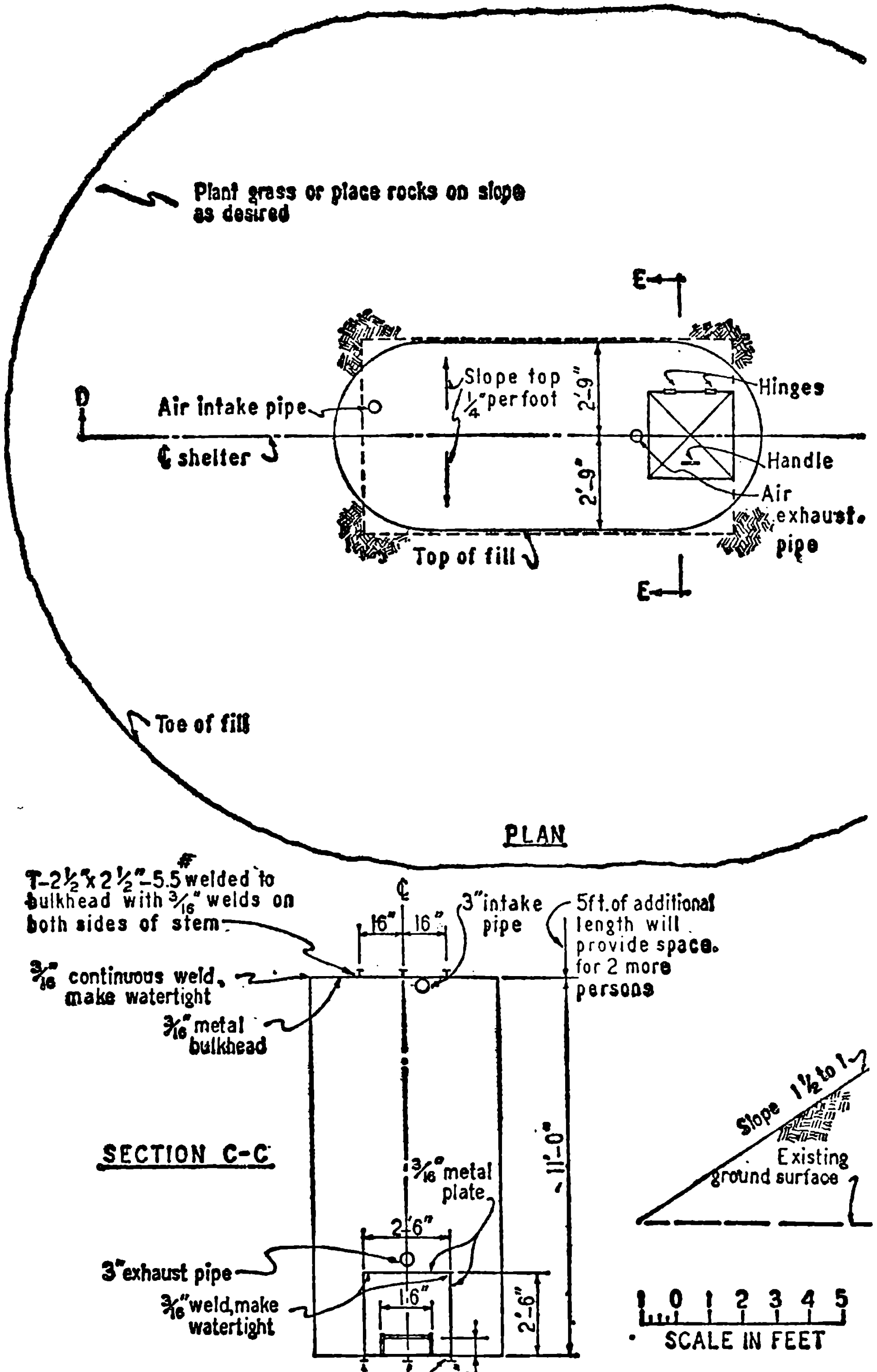
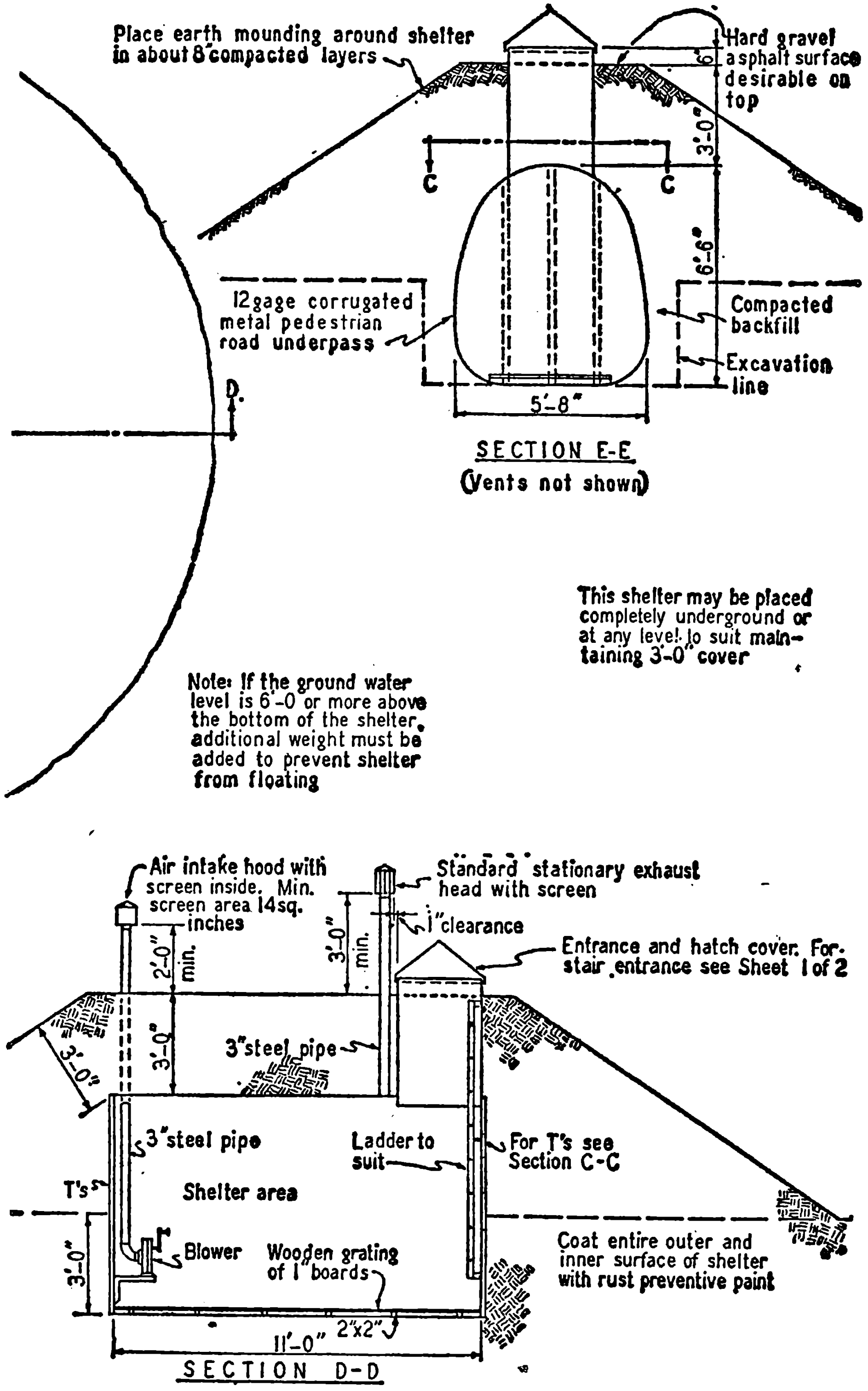

Plant grass or place rocks on slope as desired
E
Slope top ¼" per foot
2'-9"
2'-9"
Hinges
D
Air intake pipe
℄ shelter
Handle
Air exhaust pipe
Top of fill
E
Toe of fill
PLAN
T-2½"x2½"-5.5# welded to bulkhead with 3/16" welds on both sides of stem
℄
16" 16"
3" intake pipe
5 ft. of additional length will provide space for 2 more persons
3/16" continuous weld, make watertight
3/16" metal bulkhead
SECTION C-C
3/16" metal plate
11'-0"
2'-6"
3" exhaust pipe
1'6"
2'-6"
3/16" weld, make watertight
T's
6"
Slope 1½ to 1
Existing ground surface
1 0 1 2 3 4 5
SCALE IN FEET

PLATE 10—UNDERGROUND FALLOUT SHELTER

6 persons; pre-shaped metal; hatchway entrance.


Place earth mounding around shelter in about 8" compacted layers
Hard gravel asphalt surface desirable on top
6"
3'-0"
C
C
6'-6"
12 gage corrugated metal pedestrian road underpass
Compacted backfill
Excavation line
D.
5'-8"
SECTION E-E
(Vents not shown)
This shelter may be placed completely underground or at any level to suit maintaining 3'-0" cover
Note: If the ground water level is 6'-0 or more above the bottom of the shelter, additional weight must be added to prevent shelter from floating
Air intake hood with screen inside. Min. screen area 14 sq. inches
Standard stationary exhaust head with screen
2'-0" min.
3'-0" min.
1" clearance
Entrance and hatch cover. For stair entrance see Sheet 1 of 2
3'-0"
3'-0"
3" steel pipe
3" steel pipe
Ladder to suit
For T's see Section C-C
T's
Shelter area
Blower
Wooden grating of 1" boards
3'-0"
Coat entire outer and inner surface of shelter with rust preventive paint
11'-0"
2"x2"
SECTION D-D

From Plans of Office of Civil and Defense Mobilization

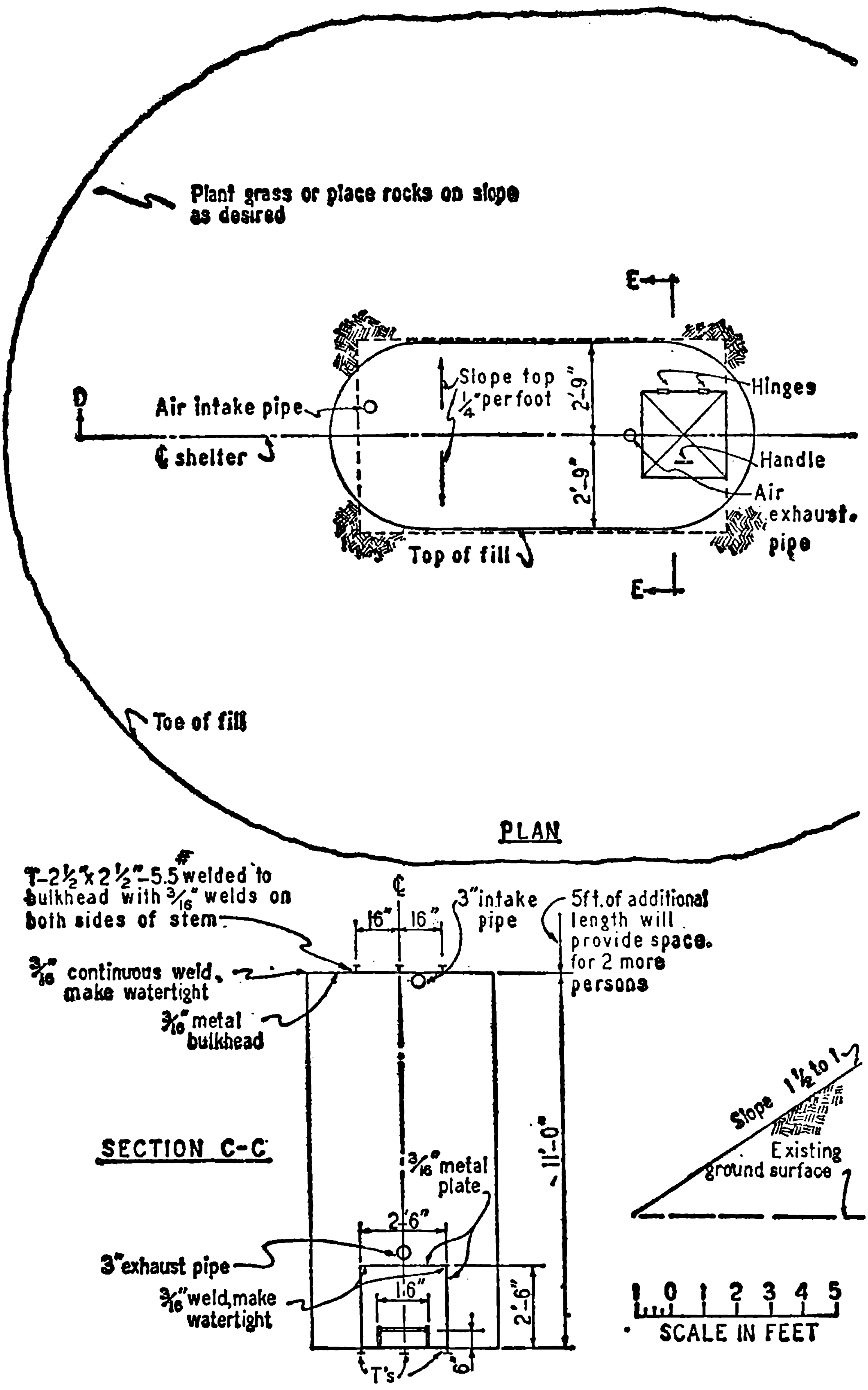
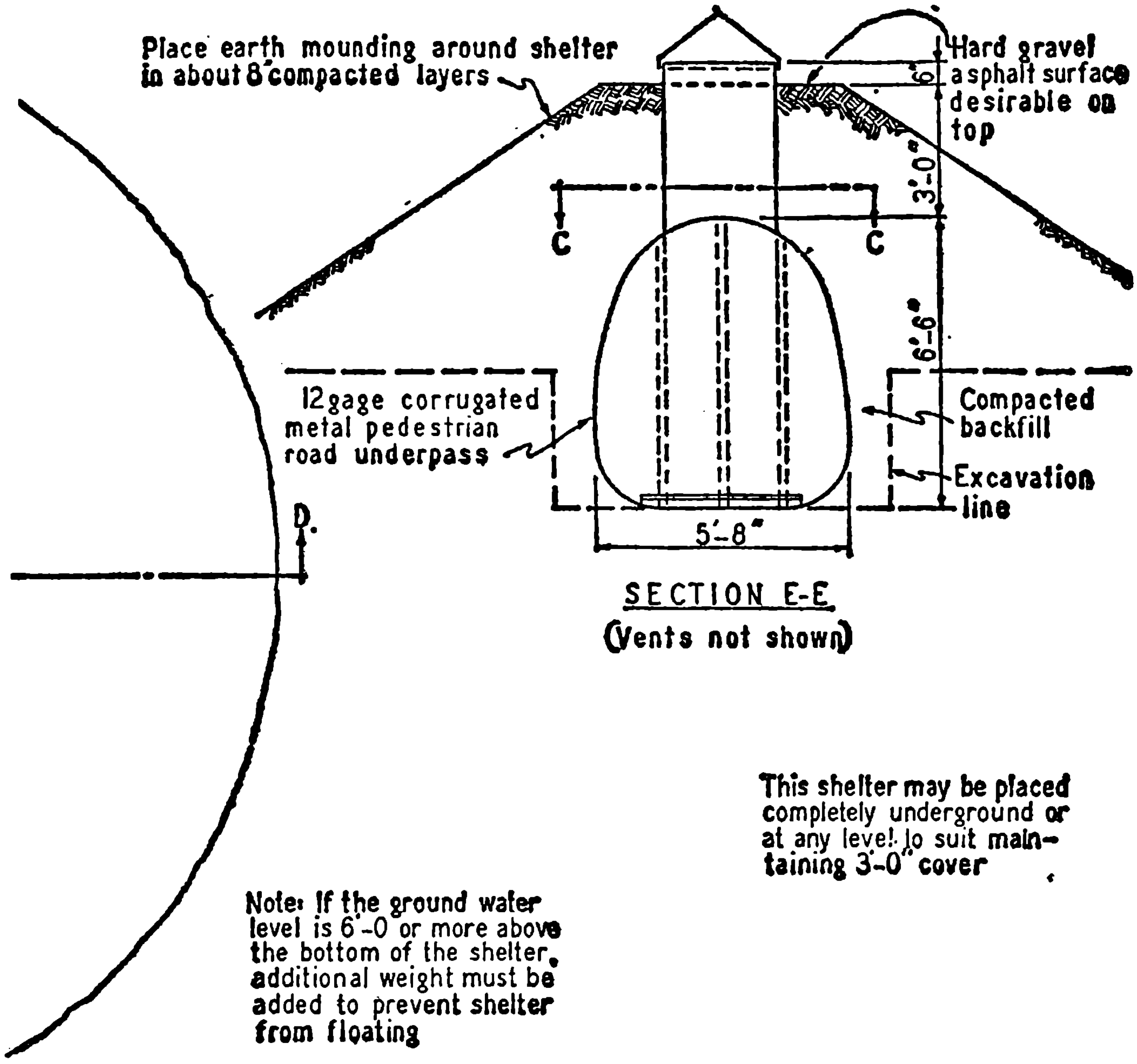

Plant grass or place rocks on slope as desired
E
Slope top ¼" per foot
2'-9"
Hinges
D
Air intake pipe
℄ shelter
2'-9"
Handle
Air exhaust pipe
Top of fill
E
Toe of fill
PLAN
T-2½x2½"-5.5# welded to bulkhead with 3/16" welds on both sides of stem
℄
16"
16"
3" intake pipe
5ft. of additional length will provide space for 2 more persons
3/16" continuous weld, make watertight
3/16" metal bulkhead
SECTION C-C
3/16" metal plate
11'-0"
Slope 1½ to 1
Existing ground surface
2'-6"
3" exhaust pipe
1.6"
3/16" weld, make watertight
2'-6"
T's
6"
1 0 1 2 3 4 5
SCALE IN FEET

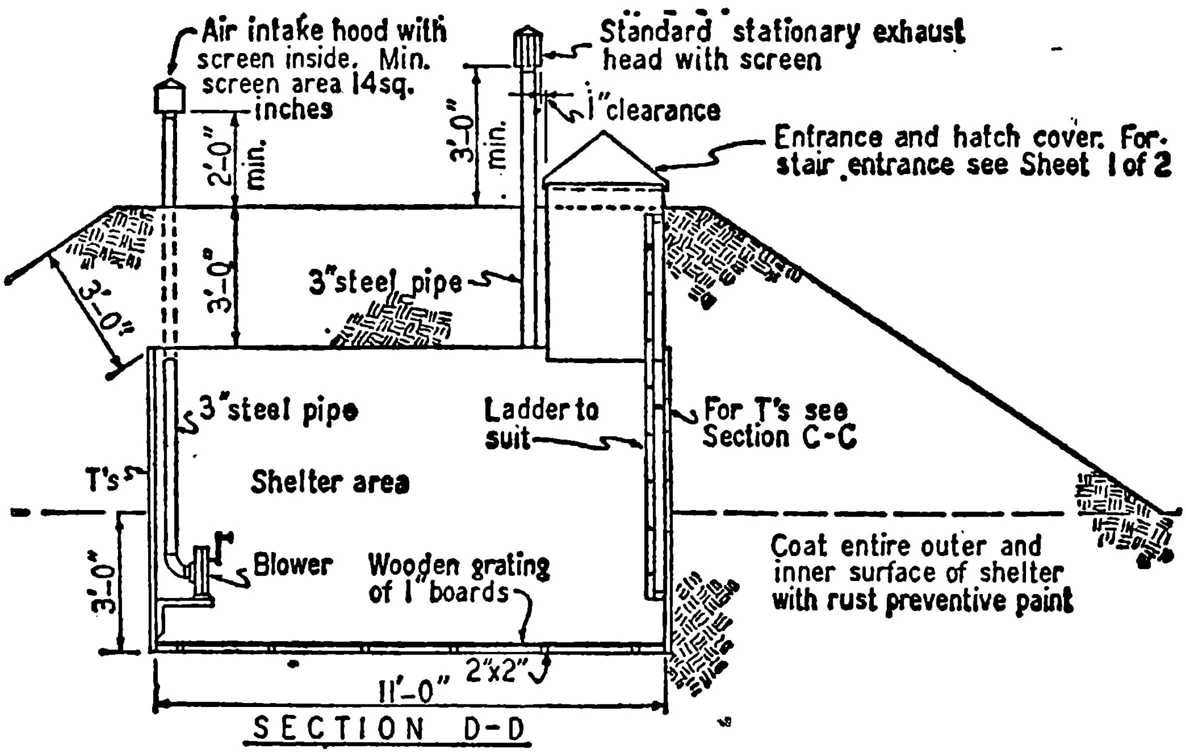
PLATE 10—UNDERGROUND FALLOUT SHELTER
6 persons; pre-shaped metal; hatchway entrance.


Place earth mounding around shelter in about 8" compacted layers
Hard gravel asphalt surface desirable on top
6"
3'-0"
C
C
6'-6"
12 gage corrugated metal pedestrian road underpass
Compacted backfill
Excavation line
5'-8"
D

SECTION E-E
(Vents not shown)

This shelter may be placed completely underground or at any level to suit maintaining 3'-0" cover

Note: If the ground water level is 6'-0 or more above the bottom of the shelter, additional weight must be added to prevent shelter from floating


Air intake hood with screen inside. Min. screen area 14 sq. inches
2'-0" min.
Standard stationary exhaust head with screen
3'-0" min.
1" clearance
Entrance and hatch cover. For stair entrance see Sheet 1 of 2
3'-0"
3'-0"
3" steel pipe
3" steel pipe
Ladder to suit
For T's see Section C-C
T's
Shelter area
3'-0"
Blower
Wooden grating of 1" boards
2"x2"
11'-0"
Coat entire outer and inner surface of shelter with rust preventive paint

SECTION D-D

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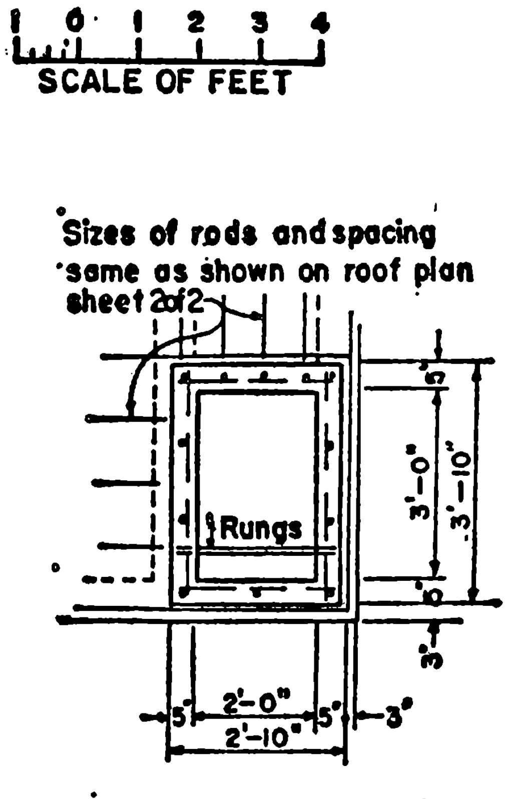
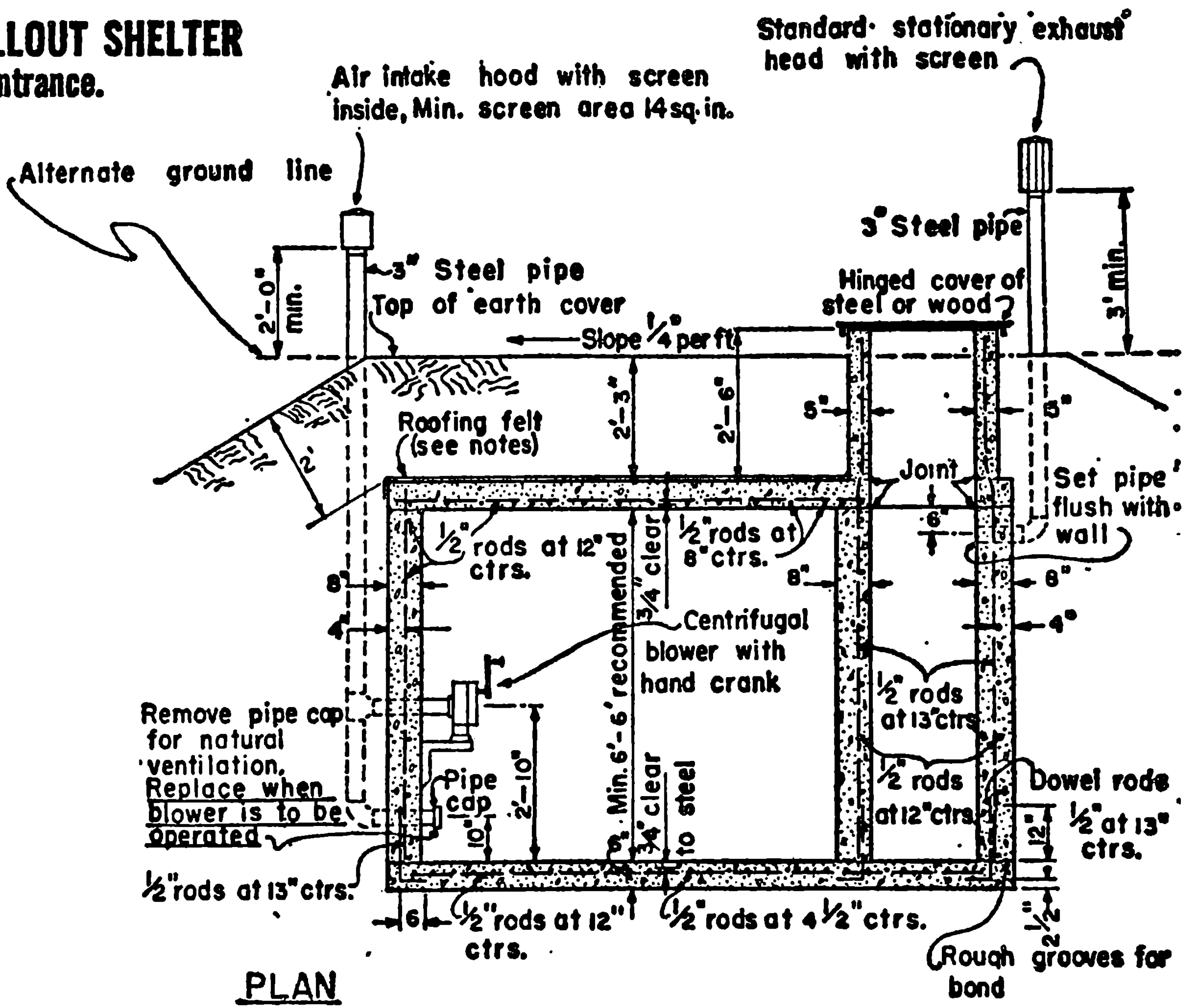
PLATE 11—UNDERGROUND FALLOUT SHELTER

6 persons; concrete, with hatchway entrance.

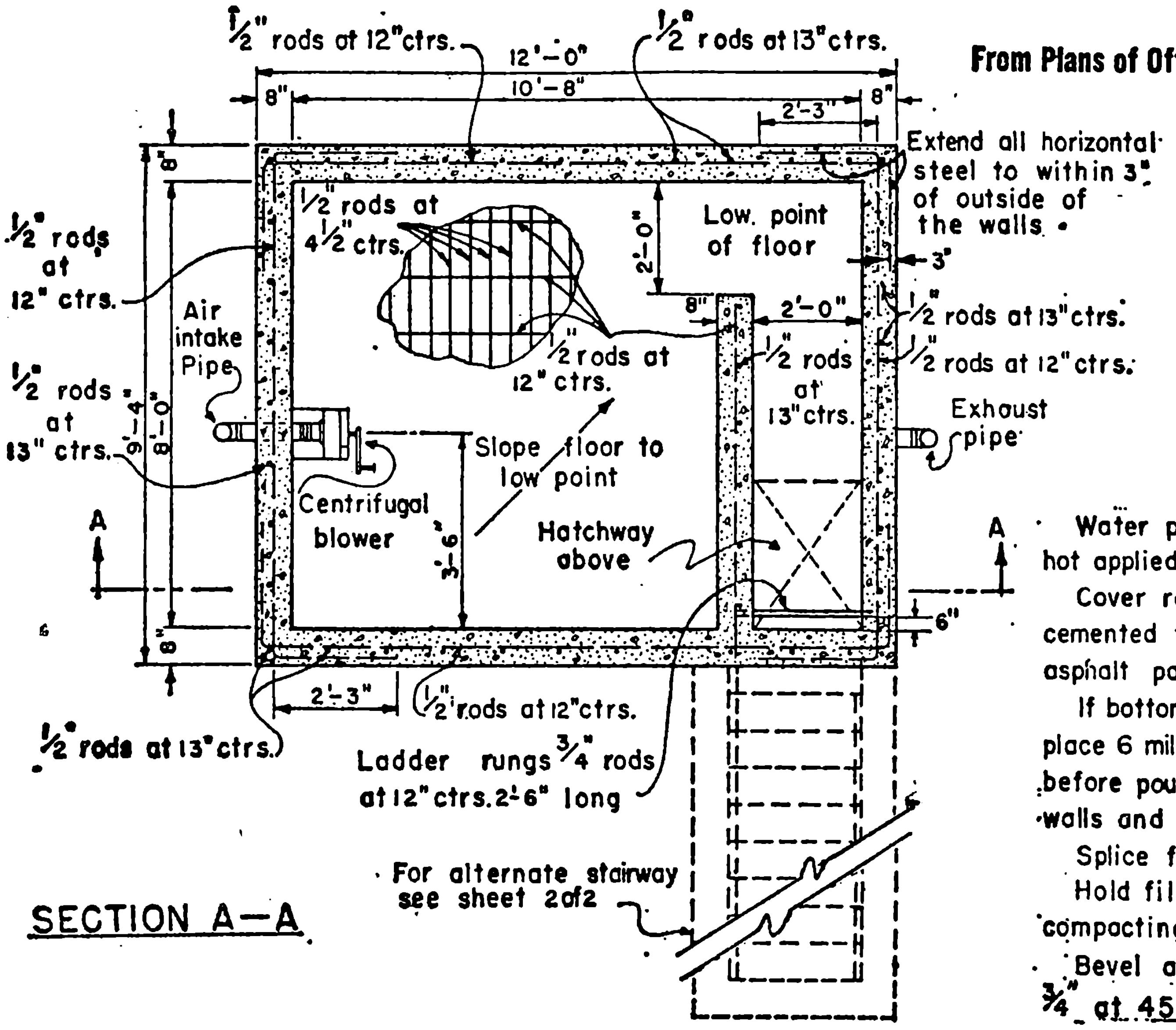

0 1 2 3 4
SCALE OF FEET
Sizes of rods and spacing same as shown on roof plan sheet 2 of 2
Rungs
3'–0"
3'–10"
6"
3"
2'–0"
2'–10"
5"
5"
3"

DETAIL OF HATCHWAY


Standard stationary exhaust head with screen
Air intake hood with screen inside, Min. screen area 14 sq. in.
Alternate ground line
2'–0" min.
3" Steel pipe
Top of earth cover
Slope 1/4" per ft.
3" Steel pipe
3' min.
Hinged cover of steel or wood
2'–3"
2'–6"
5"
5"
Roofing felt (see notes)
2'
Joint
6"
Set pipe flush with wall
1/2" rods at 12" ctrs.
3/4" clear
1/2" rods at 8" ctrs.
8"
8"
8"
4"
4"
Min. 6'–6' recommended
Centrifugal blower with hand crank
1/2" rods at 13" ctrs.
1/2" rods at 12" ctrs.
Dowel rods 1/2" at 13" ctrs.
Remove pipe cap for natural ventilation. Replace when blower is to be operated
Pipe cap
10"
2'–10"
3/4" clear to steel
6"
12"
1/2" rods at 13" ctrs.
6
1/2" rods at 12" ctrs.
1/2" rods at 4 1/2" ctrs.
1/2"
Rough grooves for bond

PLAN

From Plans of Office of Civil and Defense Mobilization


1/2" rods at 12"ctrs.
12'-0"
10'-8"
8"
1/2" rods at 13"ctrs.
2'-3"
8"
Extend all horizontal steel to within 3" of outside of the walls.
3"
1/2" rods at 4 1/2" ctrs.
Low. point of floor
2'-0"
8"
2'-0"
1/2" rods at 13"ctrs.
1/2" rods at 12"ctrs.
1/2" rods at 12" ctrs.
1/2" rods at 13"ctrs.
Exhaust pipe
1/2" rods at 12" ctrs.
Air intake Pipe
1/2" rods at 13" ctrs.
8"
9'-4"
8'-0"
8"
Slope floor to low point
Centrifugal blower
4'-6"
Hatchway above
A
A
6"
2'-3"
1/2" rods at 12"ctrs.
1/2" rods at 13"ctrs.
Ladder rungs 3/4" rods at 12"ctrs. 2'-6" long
For alternate stairway see sheet 2 of 2

SECTION A—A

NOTES:

Water proof outside walls with 2 coats of hot applied asphalt paint.

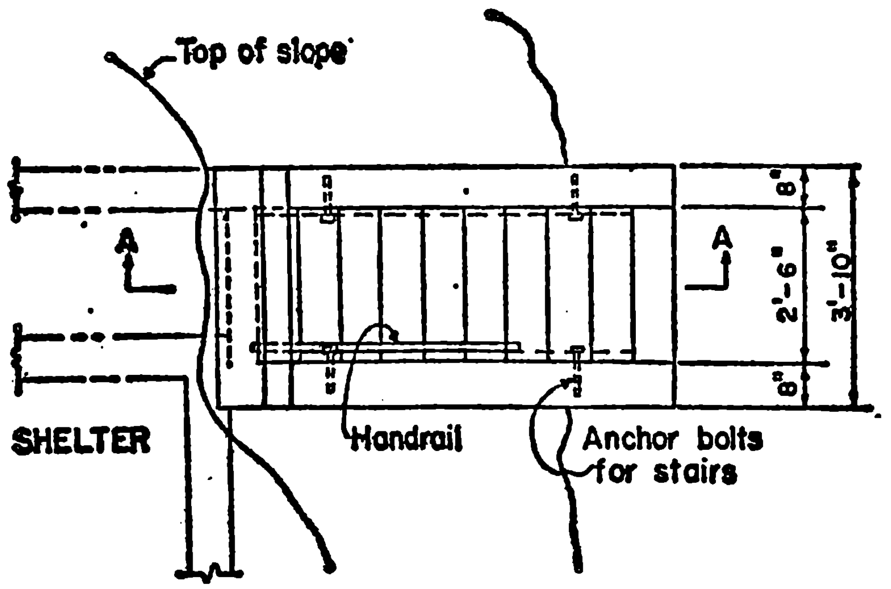
Cover roof with 2 layers of roofing felt cemented to the slab and each layer with hot asphalt paint.

If bottom of shelter is below ground water, place 6 mills thick polyethylene film, or equivalent, before pouring base slab. Also cover side walls and lap film under roofing.

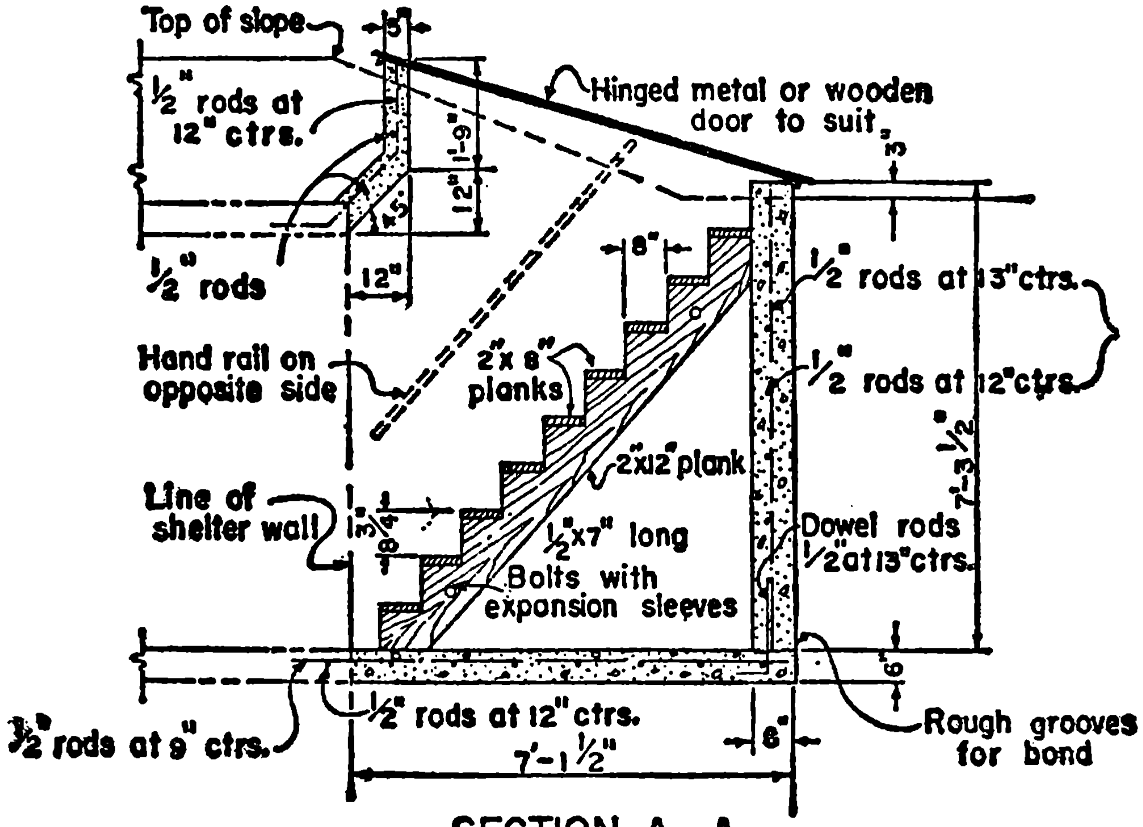
Splice film by overlapping and cementing.

Hold film against walls when placing and compacting backfill.

Bevel all exposed corners of concrete 3/4" at 45°.


Top of slope
A
A
8"
2'-6"
3'-10"
8"
SHELTER
Handrail
Anchor bolts for stairs

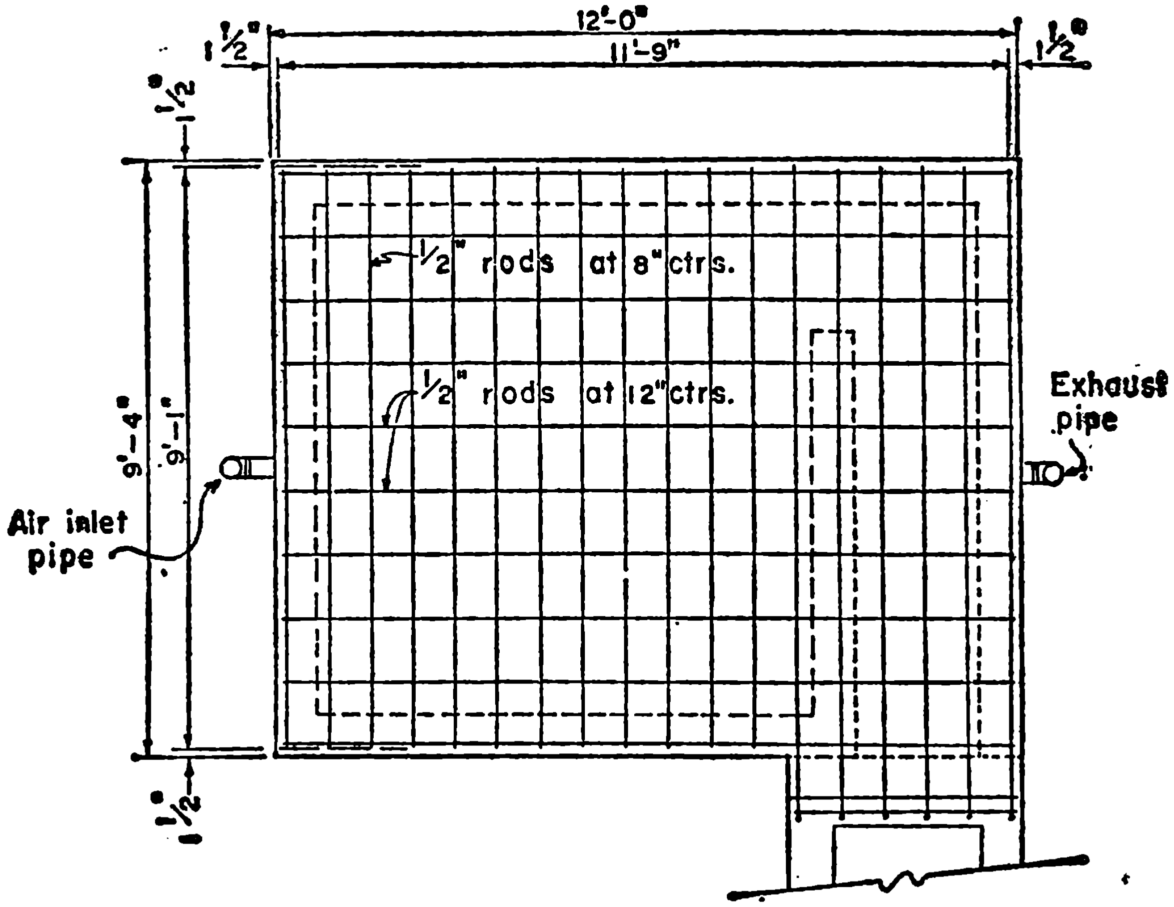
PLAN
(Door Removed)


Top of slope
5"
½" rods at 12" ctrs.
1'-9"
12"
4.5
½" rods
12"
Hinged metal or wooden door to suit.
3"
8"
½" rods at 13" ctrs.
½" rods at 12" ctrs.
Hand rail on opposite side
2"x 8" planks
2"x12" plank
7'-3½"
Line of shelter wall
1¾"
8"
½"x7" long
Bolts with expansion sleeves
Dowel rods ½" at 13" ctrs.
6"
½" rods at 9" ctrs.
½" rods at 12" ctrs.
7'-1½"
6"
Rough grooves for bond

SECTION A-A

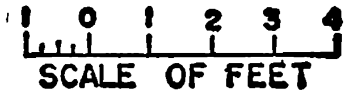
ALTERNATE STAIRWAY DETAILS

PLATE 12—UNDERGROUND FALLOUT SHELTER
Additional details, stairway and roof. (See Plate 11).


12'-0"
11'-9"
1½"
1½"
1½"
1½"
9'-4"
9'-1"
½" rods at 8" ctrs.
½" rods at 12" ctrs.
Air inlet pipe
Exhaust pipe

ROOF PLAN SHOWING REINFORCING

Same steel sizes and spacings in side walls


1 0 1 2 3 4
SCALE OF FEET

NOTES

Water proof outside walls with 2 coats of hot applied asphalt paint.

Cover roof with 2 layers of roofing felt cemented to the slab and each layer with hot asphalt paint.

If bottom of shelter is below ground water, place 6 mills thick polyethylene film, or equivalent, before pouring base slab. Also cover side walls and lap film under roofing.

Splice film by overlapping and cementing.

Hold film against walls when placing and compacting backfill.

Bevel all exposed corners of concrete ¾" at 45°

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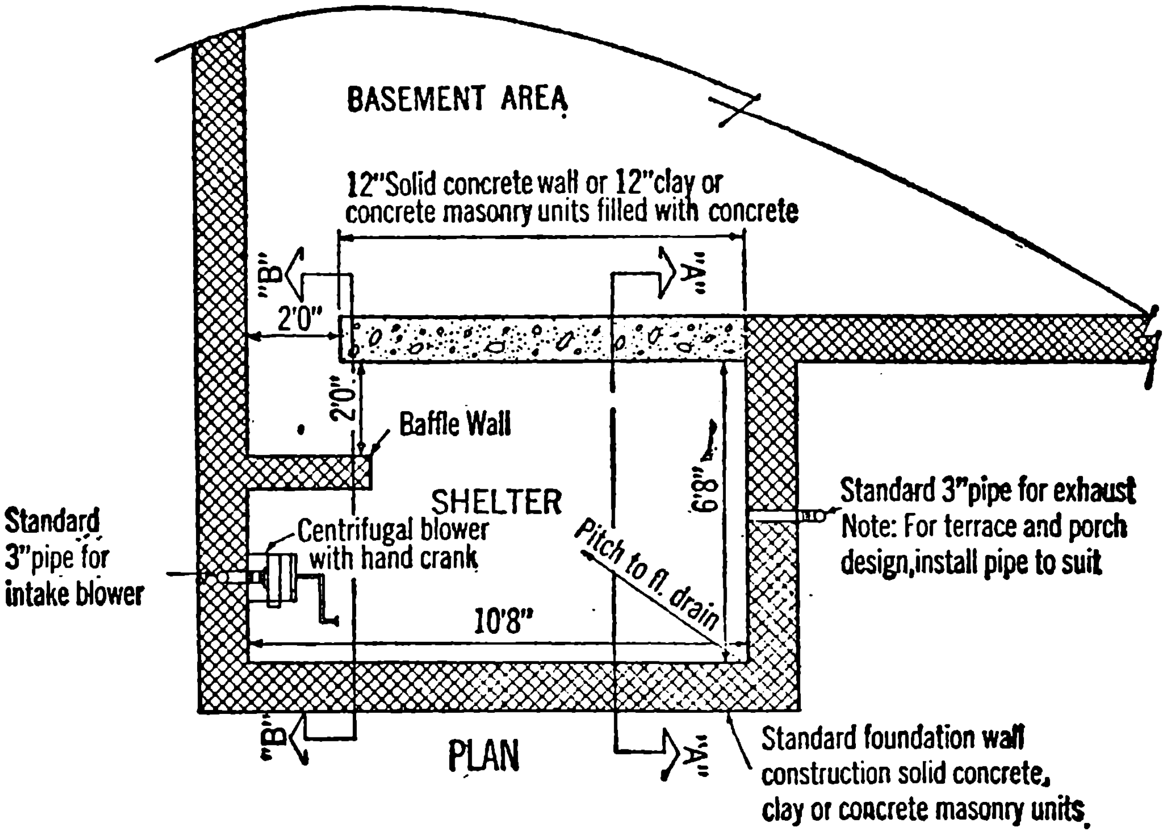

BASEMENT AREA
12"Solid concrete wall or 12"clay or concrete masonry units filled with concrete
"B"
"A"
2'0"
2'0"
Baffle Wall
SHELTER
6'8"
Standard 3"pipe for intake blower
Centrifugal blower with hand crank
Pitch to fl. drain
10'8"
Standard 3"pipe for exhaust
Note: For terrace and porch design,install pipe to suit
PLAN
Standard foundation wall construction solid concrete, clay or concrete masonry units

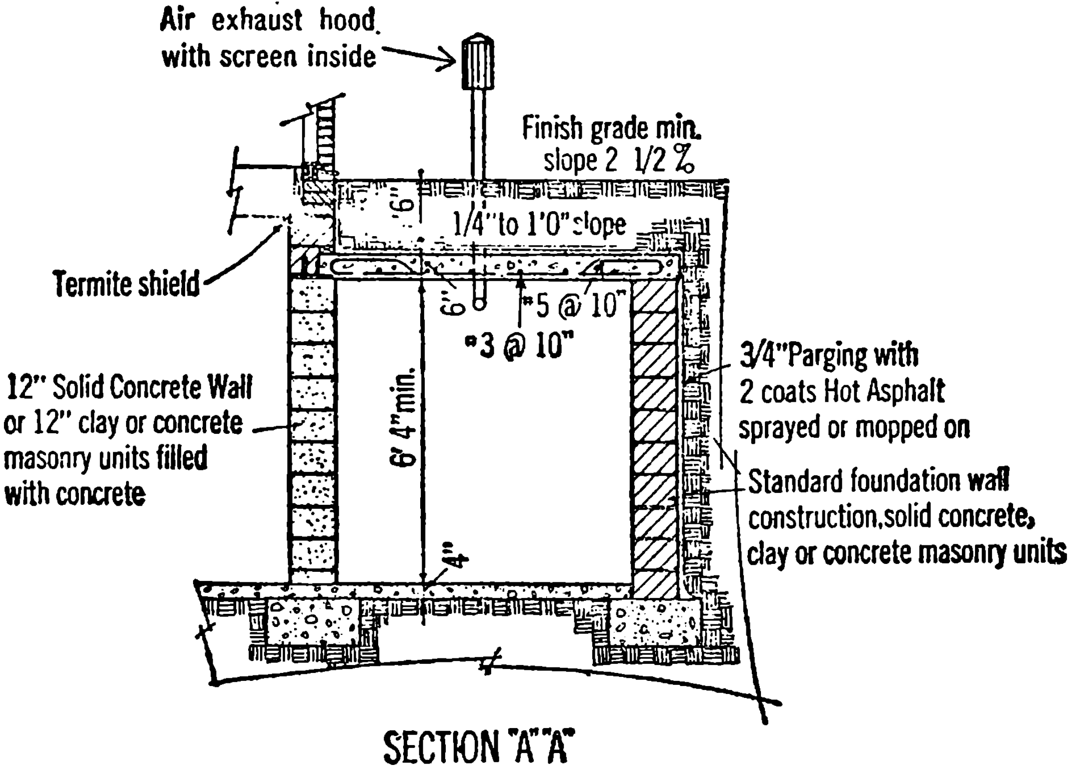
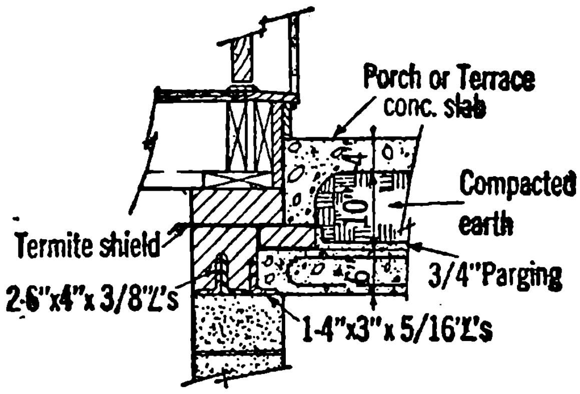
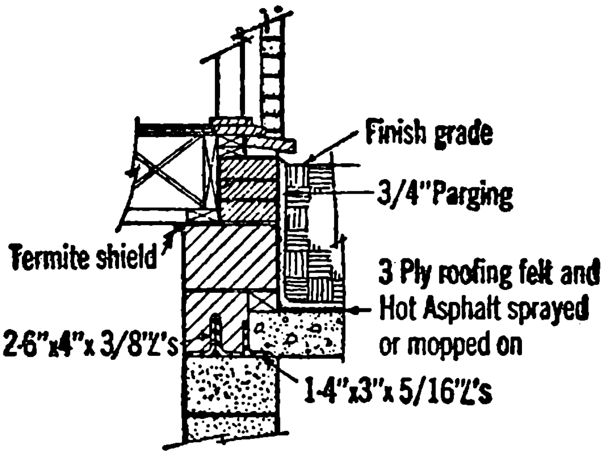

Air exhaust hood with screen inside
Finish grade min. slope 2 1/2 %
6"
1/4"to 1'0"slope
Termite shield
6"
#5 @ 10"
#3 @ 10"
3/4"Parging with 2 coats Hot Asphalt sprayed or mopped on
12" Solid Concrete Wall or 12" clay or concrete masonry units filled with concrete
6' 4"min.
Standard foundation wall construction,solid concrete, clay or concrete masonry units
4"
SECTION "A"-"A"

PLATE 13—BASEMENT FALLOUT SHELTER

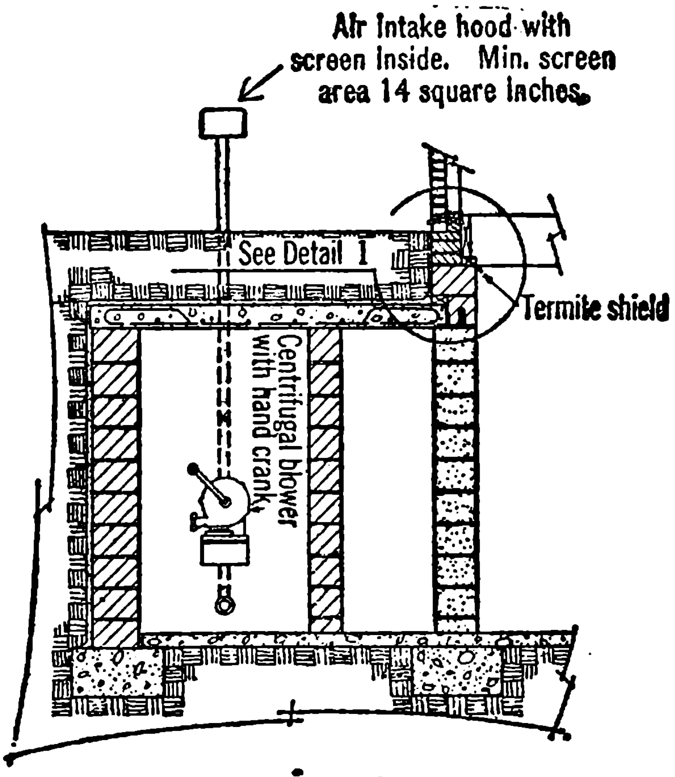
6 persons; concrete; new construction.


Porch or Terrace conc. slab
Compacted earth
Termite shield
3/4"Parging
2-6"x4"x 3/8"L's
1-4"x3"x 5/16"L's

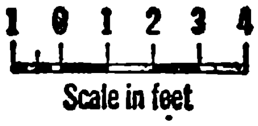
ALTERNATE DETAIL
FOR FRAME CONSTRUCTION


Finish grade
3/4"Parging
Termite shield
3 Ply roofing felt and Hot Asphalt sprayed or mopped on
2-6"x4"x 3/8"L's
1-4"x3"x 5/16"L's

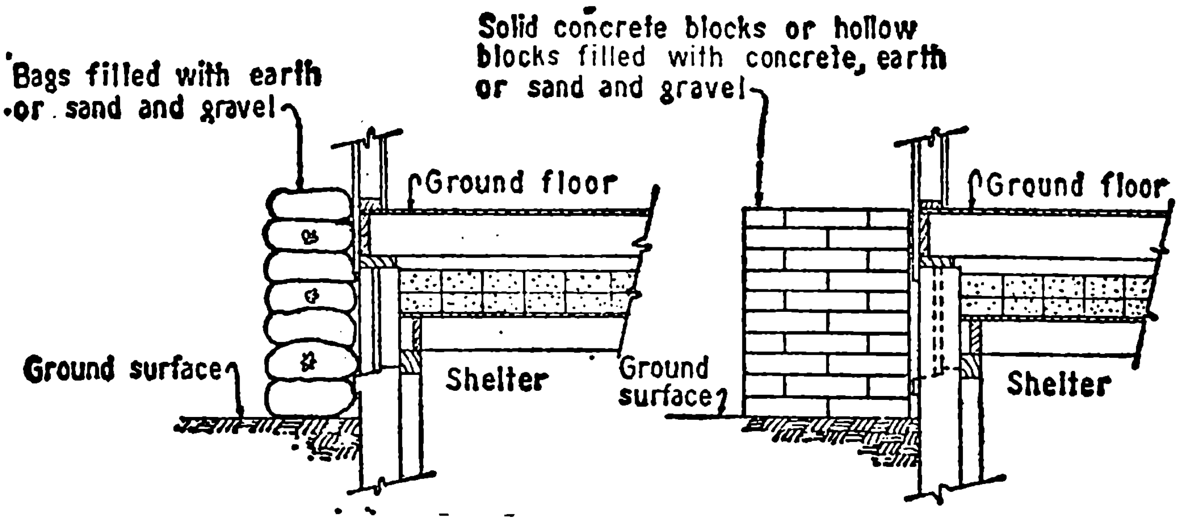
DETAIL 1
FOR MASONRY CONSTRUCTION


Air Intake hood with screen Inside. Min. screen area 14 square Inches.
See Detail 1
Termite shield
Centrifugal blower with hand crank.

SECTION "B" "B"

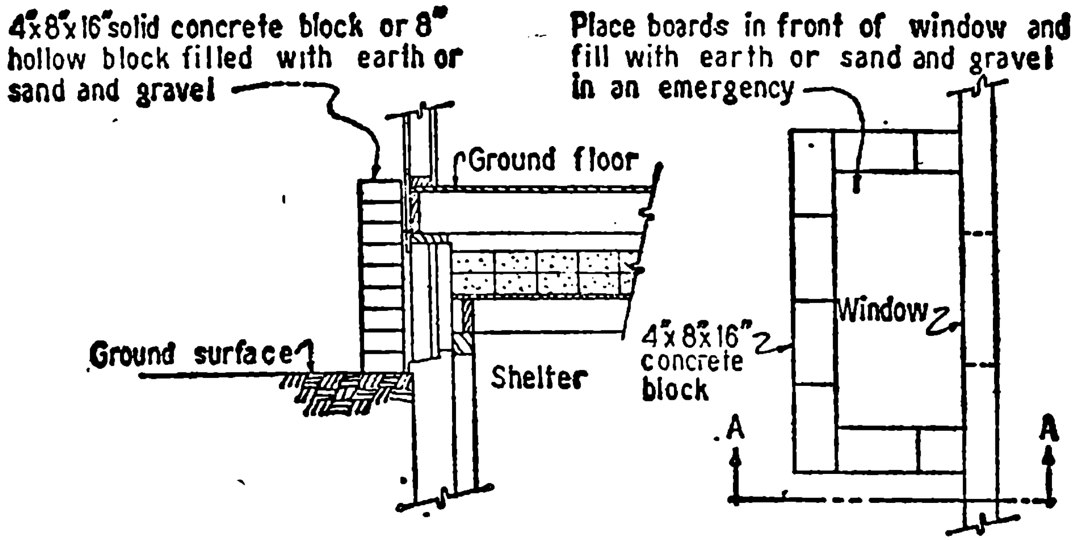

1 0 1 2 3 4
Scale in feet

From Plans of Office of Civil and Defense Mobilization


Bags filled with earth or sand and gravel
Ground floor
Ground surface
Shelter
Solid concrete blocks or hollow blocks filled with concrete, earth or sand and gravel
Ground floor
Ground surface
Shelter

BAG PROTECTION FOR ABOVE GROUND WINDOW

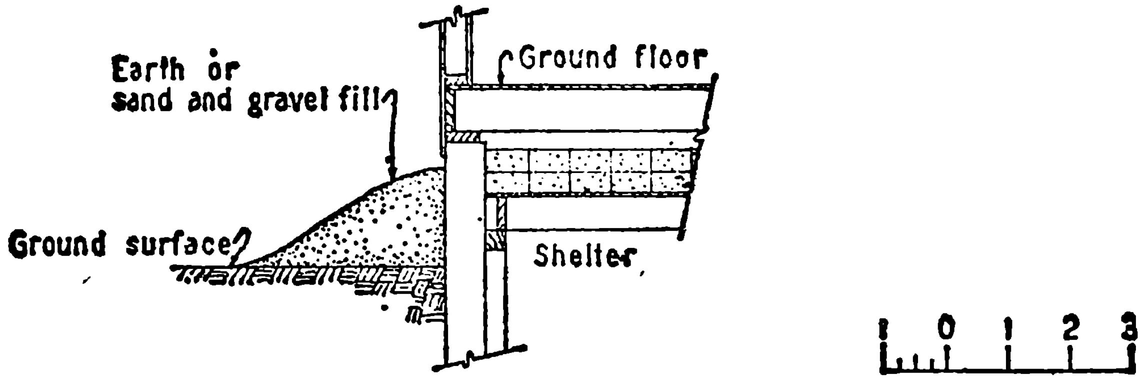
SIDE VIEW-SECTION A-A WELL TYPE FOR ABOVE GROUND WINDOW


4"x8"x16"solid concrete block or 8" hollow block filled with earth or sand and gravel
Ground floor
Ground surface
Shelter
Place boards in front of window and fill with earth or sand and gravel in an emergency
Window
4"x8"x16" concrete block
A
A

PLAN

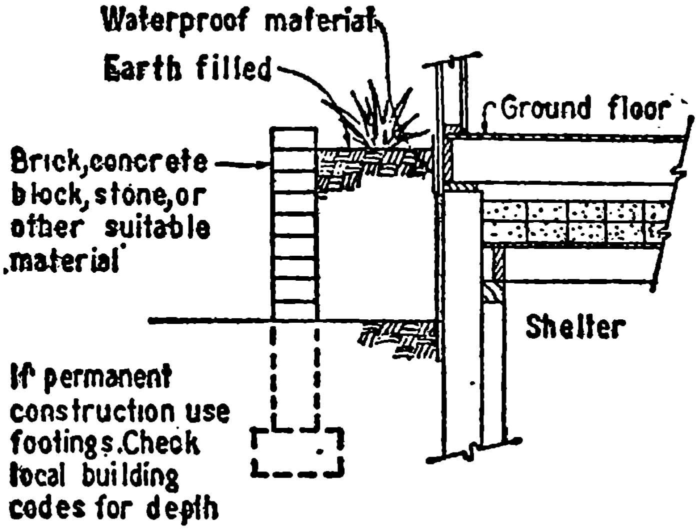
BLOCK PROTECTION FOR ABOVE GROUND WINDOW

WELL TYPE FOR ABOVE GROUND WINDOW

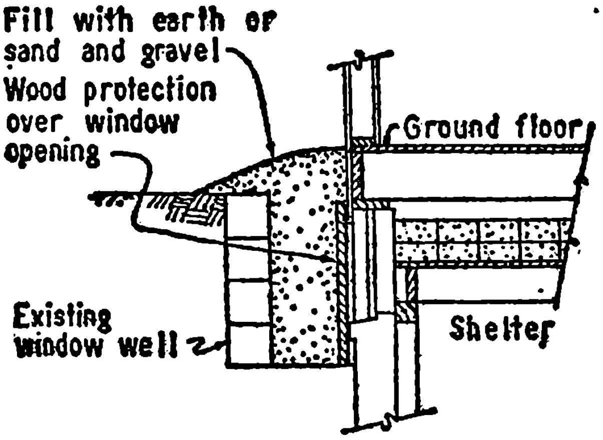

Earth or sand and gravel fill
Ground floor
Ground surface
Shelter
1 0 1 2 3
SCALE IN FEET

EARTH SHIELDING FOR EXPOSED WALLS

PLATE 14—BASEMENT FALLOUT SHELTER
Various shielding methods for windows and walls.

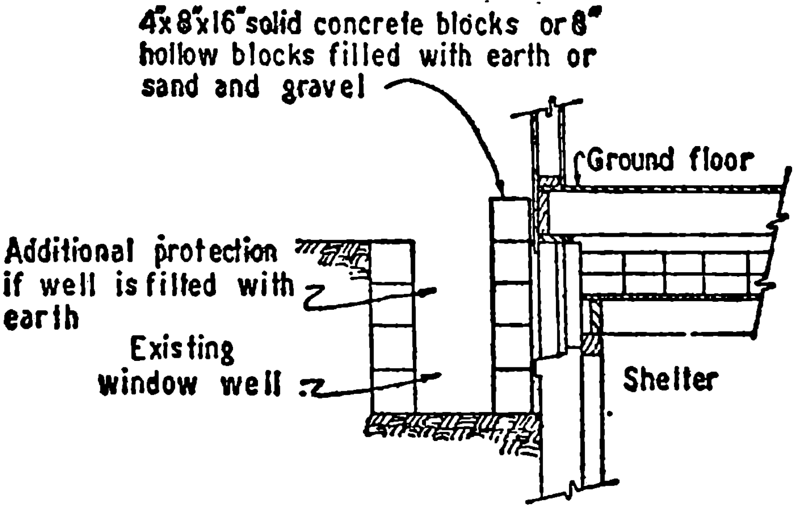

Waterproof material
Earth filled
Ground floor
Brick, concrete block, stone, or other suitable material
Shelter
If permanent construction use footings. Check local building codes for depth

PLANTER TYPE SHIELDING FOR EXPOSED WALLS


Fill with earth or sand and gravel
Wood protection over window opening
Ground floor
Existing window well
Shelter

BELOW GROUND WINDOW WELL

Note: Materials and methods shown for shielding aboveground windows can also be used for shielding exposed walls


4"x8"x16" solid concrete blocks or 8" hollow blocks filled with earth or sand and gravel
Ground floor
Additional protection if well is filled with earth
Existing window well
Shelter

BELOW GROUND WINDOW WELL

From Plans of Office of Civil and Defense Mobilization

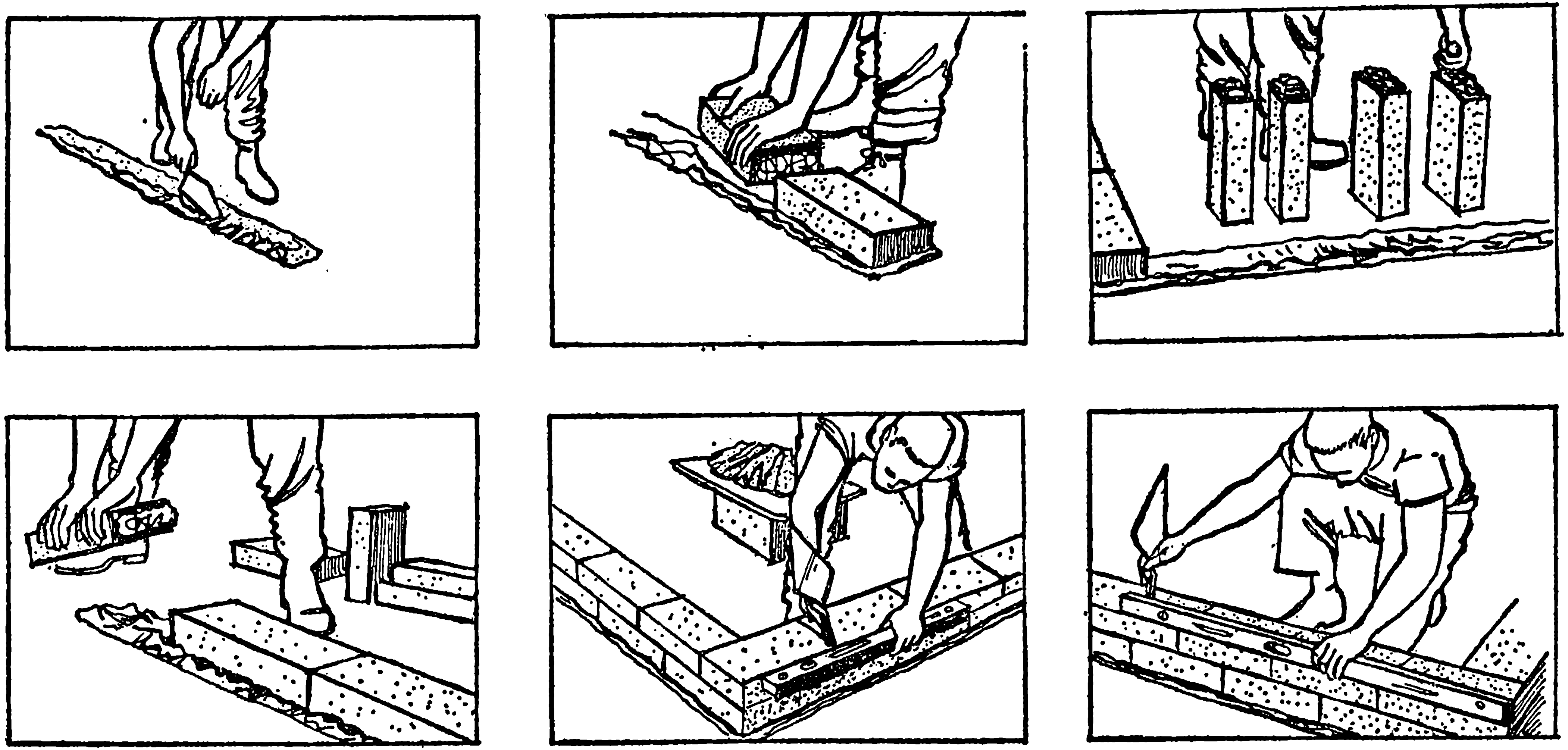


PLATE 15—HOW TO LAY A CONCRETE BLOCK WALL

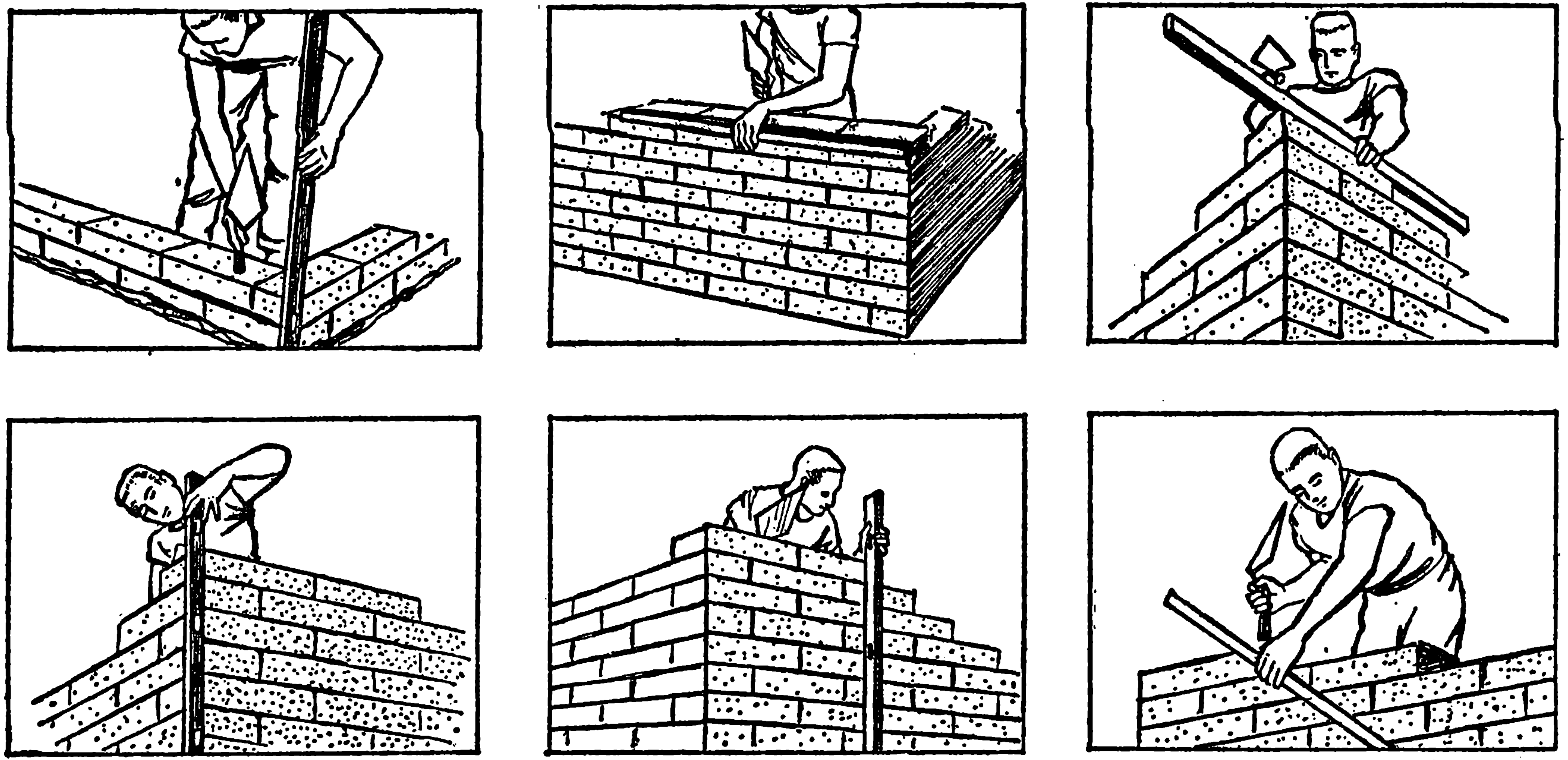


PLATE 15 —Continued

APPENDIX B TABLES

TABLE I.—Radiation Protection Factors

(For Small Aboveground Shelters)

		Roof Mass Thickness, psf					
		100	150	200	250	300	400
Wall Mass Thickness, psf	100	12	15	15	15	15	15
	150	25	40	45	50	50	50
	200	40	85	115	140	145	150
	250	50	130	230	335	385	415
	300	55	160	345	670	910	1110
	400	55	165	500	1670	5000	Greater than 5000

Shielding: There are two methods of shielding from fallout radiation—barrier shielding and geometry shielding.

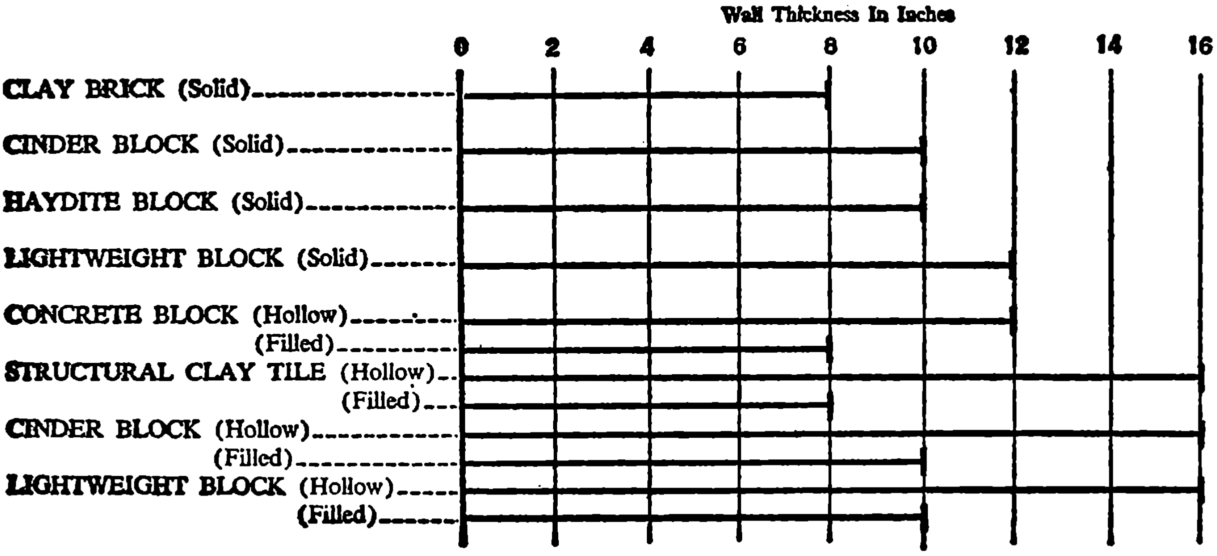
Barrier shielding is the placing of a mass between the fallout field and the individual. The heavier the protective barrier, the greater the barrier shielding effect.

Geometry shielding is determined by the extent of the fallout field affecting an individual, and/or his distance from it.

Protection factor: The combined effects of barrier shielding and geometry shielding result in a shelter "protection factor." This term is used by technicians to express the relative reduction in the amount of radiation that would be received by a person in a protected location, compared to the amount he would receive if he were unprotected. For example, if a shelter has a protection factor of 500, an unprotected person would be exposed to 500 times more radiation than someone inside the shelter.

TABLE II.

— EQUIVALENT MASS THICKNESSES (LB./SQ. FT.)



Mass thickness is the weight per unit surface area of a barrier, usually expressed in pounds per square foot. See Table II, which indicates commercially available wall thicknesses for equivalent mass thicknesses of several materials.

TABLE III.

—RELATION OF OVERPRESSURE TO DISTANCES FROM GROUND ZERO*

(For a Typical Surface Blast)

Overpressure (psi)	Distance From Ground Zero	
	20 kilotons (atomic)	20 megatons (hydrogen)
40	1,500 ft. or 0.38 mi.	15,000 ft. or 2.8 mi.
20	1,900 ft. or 0.36 mi.	19,000 ft. or 3.6 mi.
10	2,700 ft. or 0.51 mi.	27,000 ft. or 5.1 mi.
5	4,000 ft. or 0.76 mi.	40,000 ft. or 7.6 mi.
2	8,000 ft. or 1.52 mi.	80,000 ft. or 15.2 mi.

* "The Effects of Nuclear Weapons"—U. S. Dept. of Defense, 1957. Fig. 3.94a, page 109.

Overpressure: For nuclear blast design, the first important decision that must be made is the level of blast pressure that is to be resisted by the structure. This pressure is spoken of as "overpressure," or the excess of pressure over normal atmosphere pressure due to the passage of the shock front.

TABLE IV.

—DESCRIPTION OF SHELTER PROTECTION CATEGORIES*

PROTECTION FACTOR	SHELTER EXAMPLES
1,000 or greater	OCDM underground shelters Subbasements of multistory buildings Underground installations (mines, tunnels, etc.)
250 to 1,000	OCDM basement fallout shelters (heavy masonry residences) Basements (without exposed walls) of multistory buildings
50 to 250	OCDM basement fallout shelters (frame and brick veneer residences) Central areas of basements (with partially exposed walls) of multistory buildings Central areas of upper floors (excluding top floor) of large multistory buildings with heavy exterior walls and floors
10 to 50	Basements (without exposed walls) of small 1- or 2-story buildings Central areas of upper floors (excluding top floor) of large multistory buildings with light exterior walls and floors
2 to 10	Basements (partially exposed) of small 1- or 2-story buildings Central areas on ground floors in 1- or 2-story buildings with heavy masonry walls
Less than 2	Aboveground areas of low buildings, in general, including residences, stores, light industrial buildings

*BASED ON CURRENT OCDM CRITERIA.

TABLE V.—FACTORS FOR SHELTER CAPACITY PLANNING

ACTIVITY	FLOOR SPACE REQUIRED	REMARKS
Sleeping in cots	30 sq. ft.	Includes aisle space
Sleeping in double bunks	15 sq. ft.	Includes aisle space
Sleeping in triple bunks	10 sq. ft.	Includes aisle space
Sitting	8 sq. ft.	Includes aisle space
Walking		Use aisle space
Storage	2 sq. ft.	Includes space for food, bunks, etc.
Fixed equipment	As required	

TABLE VI.
—VENTILATING EQUIPMENT

Suitable ventilating blowers, air filters, and roof ventilators are available from many sources of supply, although fabrication details, and consequently the installation requirements, will differ for equipment furnished by the various manufacturers.

Positive-displacement blowers having both electric motor and geared hand-crank drives are manufactured by Roots-Connersville Blower Division, Connersville, Inc. Small centrifugal blowers having a geared hand-crank drive are made by the following manufacturers:

Buffalo Forge Company
450 Broadway
Buffalo, New York

Champion Blower and Forge Co.
Harrisburg Ave. and Charlotte St.
Lancaster, Pennsylvania

Air filters of the type used for engine or compressor intake pipes are manufactured by the following concerns:

Dollinger Corporation
6 Centre Park
Rochester, New York

Fram Corporation
Providence 16, Rhode Island

Purolator Products, Inc.
970 New Brunswick Avenue
Rahway, New Jersey

Roof ventilators are made by the following manufacturers:

Air Devices, Inc.
185 Madison Avenue
New York City 16, New York

G. C. Breidert Company
P. O. Box 1190
San Fernando, California

Penn Ventilator Company
3252 Goodman Avenue
Philadelphia 40, Pennsylvania

The names of specific manufacturers of blowers, filters, and roof ventilators are given only as examples, and do not denote a preference for their products. Local contractors, dealers, or distributors of heating, ventilating, and air conditioning equipment may be consulted when selecting equipment for a protective shelter.

TABLE VII—MASS THICKNESSES Item	Thickness	Weight (mass thickness)
	Inches	*lb./sq. ft.*
Asbestos:		
Board	3/16	2
Corrugated		4
Shingles	5/32	2
Asphalt:		
Roofing (3 ply)		1
Roofing (4 ply and gravel)		6
Roofing (5 ply and gravel)		7
Shingles		2
Clay:		
Brick	1	8–10
Tile:		
Facing	2	15
Facing	4	25
Facing	6	38
Partition	4	18
Partition	6	28
Partition	8	34
Partition	10	40
Shingles		10–20
Structural	8	42
Structural	12	58
Concrete:		
Cinder	1	9
Haydite	1	8
Lightweight	1	6–8
Reinforced	1	12½
Slag	1	10–11
Stone or gravel (std. wt.)	1	12–12½
Block (hollow)		
Stone or gravel (std. wt)	4	30
	6	42
	8	55
Concrete	12	85
Cinder	4	22
	6	30
	8	39
	12	61
Lightweight	4	20
	6	28
	8	39
	12	61
Fiberboard or sheathing	½	1
Glass panes	¼	3½
Gypsum:		
Block	2	8–10
Block	4	10–12
Board or sheathing	½	2

TABLE VII, cont'd Item	Thickness	Weight (mass thickness)
	Inches	*lb./sq. ft.*
Plaster:		
Applied directly or on lath	½–¾	5–6
Solid	1	8–10
Plywood sheathing	⅜	1
Slate	$\frac{3}{16}$	7
Soil:		
Clay	1	6–8
Loam	1	7–9
Sand and gravel	1	8–10
Steel:		
Plate	1	41
Corrugated sheet	20 Ga	2
Panels	18 Ga	3
Stone masonry	1	10–14
Stucco	¾	5
Terra cotta	1	5
Wood:		
Sheathing	1	2½
Shingles		2½
Siding	1	1–2½

This brief table of mass thicknesses is presented as guidance only. In general, it may be assumed that the weights given for the various types of roof, floor, and wall construction as found in standard engineering tables are equivalent to the mass thickness of the construction. Publications of the American Standards Association, the American Institute of Steel Construction, the American Concrete Institute, and others may be used for this purpose.

APPENDIX C

CHECKLISTS

OFFICIAL CIVIL DEFENSE PUBLICATIONS

The following Federal Civil Defense Administration publications are on sale by the Superintendent of Documents, Washington 25, D. C., and may be ordered direct from there. Many of them are likewise available from your local Civil Defense Headquarters.

1. *National Plan for Civil Defense and Defense Mobilization,* 1958. What you should know about the national plan.
2. *United States Civil Defense,* 1950, 25 cents. The national plan for organizing the civil defense of the United States.

PUBLIC BOOKLETS, HANDBOOKS AND LEAFLETS

1. *Air-Raid Alert Card,* 1951, 5 cents, $1.50 per 100 copies. Instruction card on what to do in case of an atomic attack.
2. *Atomic Blast Creates Fire,* 1951, Leaflet, 5 cents. Instructions to householders on how to reduce fire hazards and prevent fires in the home.
3. *Before Disaster Strikes—What To Do Now About Emergency Sanitation at Home,* 1953 Pub. H-11-1, 15 cents. Gives information on maintaining sanitary conditions in the home during the first few days after an enemy attack.

4. *Civil Defense Household First Aid Kit,* 1951, Leaflet, 5 cents. Lists first-aid items for a family of four or less; gives items to be stocked, quantity, substitutes and uses.
5. *Conelrad,* 1953, 5 cents. Instructions on radio dial settings for receipt of official information in time of civil defense emergency.
6. *Duck and Cover,* 1951, Pub. PA-6, 5 cents. Cartoon instruction for children on what to do in case of atomic attack.
7. *Emergency Action To Save Lives,* 1951, Pub. PA-5, 10 cents. Practical instructions for the untrained person on the emergency care of injured people.
8. *Fire Fighting for Householders,* 1951, Pub. PA-4, 5 cents. Basic information for the householder on how fires start, how they can be prevented, and how to fight fires.
9. *Survival Under Atomic Attack,* 1950, 10 cents. Techniques of personal survival under atomic bomb attacks.
10. *This Is Civil Defense,* 1951, Pub. PA-3, 10 cents. Highlights of the national civil defense program and the part the volunteer must play to make civil defense a success.
11. *The Welfare Task in Civil Defense,* 1953, 5 cents. Presents in picture and text form the four components of civil defense emergency welfare.
12. *What About You and Civil Defense?,* 1953, Booklet, 5 cents. Uses the 12 Alert America color posters to give to the public in picture form the story of the need for civil defense and what each person can do.
13. *What You Can Do Now!,* 1952, Leaflet, 5 cents. Outlines steps for preparing the home and the family against enemy attack.
14. *What You Should Know About Biological Warfare,* 1951, Pub. PA-2, 10 cents. Techniques of personal survival under biological warfare attacks.
15. *A Family Action Program—Home Protection Exercises,* 1955, Booklet, 25 cents. A series of eight exercises to drill the entire family for action in emergency.

16. *Facts About Fallout,* 1955, Booklet, 10 cents. Gives the simple facts about radioactive fallout.
17. *Six Steps to Survival,* 1955, Leaflet, 5 cents. Outlines steps to take if an enemy attacked.

TECHNICAL MANUALS

1. *Civil Defense in Schools,* 1952, Pub. TM-16-1, 15 cents. A guide and reference for local and state superintendents of schools in organizing and operating programs for the self-protection of schools, their physical facilities, staff and students.
2. *Emergency Medical Treatment,* 1952, Pub. TM-11-8, 25 cents. Summarizes treatment recommended for large numbers of casualties in disasters, such as atomic bombing, intense high-explosive or incendiary bombing, as well as munitions explosions in populated areas.
3. *Fire Effects of Bombing Attacks,* 1952, Pub. TM-9-2, 20 cents. Summarizes data on World War II bombing attacks and suggests a method of appraising fire susceptibility of cities to minimize the effects of mass fires.
4. *Home Shelters—For Family Protection in an Atomic Attack,* 1953, Pub. TM-5-5, 30 cents. Describes basement leanto, basement corner-room, covered-trench, and basement-exit shelters; helps the householder select the type of shelter best suited to his needs; and gives step-by-step building instructions. The information in this manual is also published separately for the various types of shelters. These publications are listed below:
    - *Lean-to Shelters—For Family Protection in an Atomic Attack,* 1953, 10 cents.
    - *Corner-Room Shelter—For Family Protection in an Atomic Attack,* 1953, 10 cents.
    - *Outdoor Shelters—For Family Protection in an Atomic Attack,* 1953, 15 cents.
5. *Interim Guide for the Design of Buildings Exposed*

to Atomic Blast, 1952, Pub. TM-5-3, 15 cents. Suggests to architects and engineers methods of increasing the strength of new buildings to resist atomic blast, and points out hazards which should be considered in the design of shelter areas in buildings.

6. *Rescue Techniques and Operations,* 1953, Pub. TM-14-1, 35 cents. Explains rescue techniques and operations to members of civil defense rescue services; and describes the rescue squad's tools and equipment and gives instructions for their use.
7. *Shelter from Atomic Attack in Existing Buildings,* Part I, *Method for Determining Shelter Needs and Shelter Areas,* 1952, Pub. TM-5-1, 20 cents. Instructions, forms, and recommendations for use of civil defense directors, survey teams and their supervisors, and technically qualified personnel in conducting a shelter survey.
8. *Shelter from Atomic Attack in Existing Buildings,* Part II—*Improvement of Shelter Areas,* 1952, Pub. TM-5-2, 15 cents. Offers suggestions to architects and engineers for improving certain shelter areas.
9. *Windowless Structures—A Study in Blast-Resistant Design,* 1952, Pub. TM-5-4, $1.00. Describes methods and procedures for designing windowless structures or windowless portions of conventional structures, based on the dynamic properties of loading; presents principles, methods, and formulas for determining the magnitude, duration, and distribution of blast loads on windowless structures.
10. *Civil Defense Technical Bulletin,* 1958, Pub. TB-5-3, 5 cents. A digest of technical information on family shelters for protection against radioactive fallout.
11. *The Family Fallout Shelter,* 1959, Pub. MP-15, 10 cents. Describes various types of concrete and concrete block shelters, and gives step-by-step building instructions.
12. *Clay Masonry Family Fallout Shelters,* 1960, Pub. MP-18. Describes various types of brick and clay masonry shelters, and gives step-by-step building instructions.
13. *Fallout Shelter Surveys: Guide for Executives,* Pub.

NP-10-1. Provides background guidance for the executive—in government, industry, or other large facility—responsible for planning and directing a fallout shelter survey.

14. *Fallout Shelter Surveys: Guide for Architects and Engineers*, 1960, Pub. NP-10-2. Provides architects and engineers with procedures and standards for evaluating existing structures and modifying them to improve their worth as fallout shelters.
15. *Civil Defense Against Biological Warfare*, 1953, Pub. TM-11-10, 20 cents. Appraises the hazards of biological warfare and describes the defenses to be prepared.

WHAT TO DO WHEN YOU HEAR AN ALERT

Obey Your Civil Defense Wardens It May Save Your Life

Do not attempt to use your telephone.

Turn off all utilities—gas, water, electric.

Keep your shades drawn to guard against flying glass.

Have a FIRST AID KIT in your home.

Do not leave your home except to seek shelter, unless otherwise directed. You may expose yourself to deadly fallout.

Cooperate With Your Wardens

Do not move your car unless so directed by your wardens. Unauthorized travel may take you directly into the path of an invisible but deadly fallout.

Tune in your car or battery radio to 640 or 1240 for official C. D. instructions.

Keep a supply of water and canned food on hand.

Obey Your Wardens

They will have official plans and orders for you and will keep you informed.

If your children or other members of your family are away from home, PLEASE do not worry about them. They are being cared for and will be located through the Welfare Registration Service.

WHAT TO DO TO REMOVE FIRE HAZARDS

Check your closets, attic and basement for cast-off articles that would burn.

Clean out your storage places.

Collect and burn or haul away all rubbish in your backyard, in alleys, and in vacant lots near your home.

If you have an air-space instead of an attic, make sure you can get into it through a trap door. Keep a ladder handy. And by all means, don't store anything flammable there.

Take a look at your electrical system. Buy new plugs and cords if yours are worn. Get advice from an electrician if fuses blow frequently.

Be sure your heating plant is safe. Make certain your chimney is clean and in good condition; and while you're up there, check the roof.

If furnace pipes and connections are cracked and rusted, replace them.

Don't allow your family to put magazines, papers or clothing on radiators or near furnaces, hot air grilles or open flames and don't allow lamp shades to come in contact with light bulbs.

Take another look at your basement for open paint or oil cans, paint and turpentine rags, sawdust and shavings near work bench, or flammable materials (including fuel). If closer than three feet to the furnace, get rid of them.

Make sure that such inflammable volatile fluids as gasoline, benzine, naphtha, and similar fluids are stored in tightly closed metal containers outside your home. They should never be used or kept inside the house.

Put oil-soaked rags, paints, and quick-drying liquids in airtight metal containers.
Re-read Chapter 4—"Fires Can Be Prevented," page 59.

CHECKLIST OF FIRE-FIGHTING EQUIPMENT

Chemical fire extinguisher
Garden hose in good condition
Hose adapter for inside faucets
Hand pump with nozzle delivering spray and solid streams
Equivalent of a barrel of water, stored and covered
Buckets of sand
Long-handled shovel
Coal scuttle or empty bucket
Heavy gloves
Ladder in good condition
Test your equipment every two weeks

Know How To:
  Take a leg lock on a ladder
  Fight a magnesium bomb
  Rescue an unconscious person
  Get out of a building if stairs are blocked
  Keep from losing your head

Never stop fighting a fire except to save your life
Re-read Chapter 4—"Knowing How to Fight Fire," page 62.

CHECK LIST OF EMERGENCY FIRST-AID ITEMS

FOR THESE PURPOSES	USE THESE	OR THESE	SUGGESTED QUANTITY
For open wounds, scratches, and cuts. Not for burns.	1. **Antiseptic solution:** Benzalkonium Chloride Solution, U.S.P., 1 to 1,000 parts of water.	Quaternary ammonium compounds in water. Sold under trade names as Zephiran, Phemerol, Ceepryn, and Bactine.	3- to 6-oz. bottle.
For faintness, adult dose ½ teaspoon in cup of water; children 5 to 10 drops in ½ glass of water. As smelling salts, remove stopper, hold bottle under nose.	2. **Aromatic spirits of ammonia.**		1- to 2-oz. bottle.
For shock—dissolve 1 teaspoonful salt and ½ teaspoonful baking soda in 1 quart water. Have patient drink as much as he will. Don't give to unconscious person or semiconscious person. If using substitutes dissolve six 10-gr. sodium chloride tablets and six 5-gr. sodium bicarbonate (or sodium citrate) tablets in 1 qt. water.	3. **Table salt.**	Sodium chloride tablets, 10 gr., 50 tablets in bottle.	1 box.
	4. **Baking soda.**	Sodium bicarbonate or sodium citrate tablets, 5 gr., 50 tablets in bottle.	8- to 10-oz. box.
For a sling; as a cover; for a dressing.	5. **Triangular bandage,** folded, 37 by 37 by 52 in., with 2 safety pins.	Muslin or other strong material. Cut to exact dimensions. Fold and wrap each bandage and 2 safety pins separately in paper.	4 bandages.
For open wounds or for dry dressings for burns. These are packaged sterile.	6. **Two medium first aid dressings,** folded, sterile with gauze enclosed cotton pads, 8 in. by 7½ in. Packaged with muslin bandage and 4 safety pins.	a) Two emergency dressings 8 in. by 7½ in., in glassine bags, sterilized. One roller bandage, 2 in. by 10 yds. b) Four large sanitary napkins, wrapped separately and sterilized. One roller bandage, 2 in. by 10 yds.	As indicated.

For open wounds or for dry dressings for burns. These are packaged sterile.	7. **Two small first aid dressings,** folded, sterile with gauze enclosed cotton pads and gauze bandage, 4 in. by 7 in.	Twelve sterile gauze pads in individual packages, 3 in. by 3 in. One roller bandage, 1 in. by 10 yds.	As indicated.
For eyes irritated by dust, smoke, or fumes. Use 2 drops in each eye. Apply cold compresses every 20 minutes if possible.	8. **Eye drops.**	Bland eye drops sold by druggists under various trade names.	½- to 1-oz bottle with dropper.
For splinting broken fingers or other small bones and for stirring solutions.	9. **Twelve tongue blades, wooden.**	Shingles, pieces of orange crate, or other light wood cut to approximately 1½ in. by 6 in.	As indicated.
For purifying water when it cannot be boiled. (Radioactive contamination cannot be neutralized or removed by boiling or by disinfectants.)	10. **Water purification tablets** Iodine (trade names—Globaline, Bursoline, Potable Aqua) Chlorine (trade name—Halazone).	Tincture of iodine or iodine solution (3 drops per quart of water). Household bleach (approx. 5% available chlorine) 3 drops per quart of water.	Tablets—Bottle of 50 or 100. Liquid—One small bottle.
For bandages or dressings: Old soft towels and sheets are best. Cut in sizes necessary to cover wounds. Towels are burn dressings. Place over burns and fasten with triangular bandage or strips of sheet. Towels and sheets should be laundered, ironed, and packaged in heavy paper. Relaunder every 3 months.	11. **Large bath towels.**		2.
	12. **Small bath towels.**		2.
	13. **Bed sheet.**		1.
For administering stimulants and liquids.	14. **Paper drinking cups.**		25 to 50.
Electric lights may go out. Wrap batteries separately in moistureproof covering. Don't keep in flashlight.	15. **Flashlight.**		1.
	16. **Flashlight batteries.**		3.
For holding bandages in place.	17. **Safety pins, 1½ in. long.**		12 to 15.

CHECK LIST OF EMERGENCY FIRST-AID ITEMS

FOR THESE PURPOSES	USE THESE	OR THESE	SUGGESTED QUANTITY
For open wounds, scratches, and cuts. Not for burns.	1. **Antiseptic solution:** Benzalkonium Chloride Solution, U.S.P., 1 to 1,000 parts of water.	Quaternary ammonium compounds in water. Sold under trade names as Zephiran, Phemerol, Ceepryn, and Bactine.	3- to 6-oz. bottle.
For faintness, adult dose ½ teaspoon in cup of water; children 5 to 10 drops in ½ glass of water. As smelling salts, remove stopper, hold bottle under nose.	2. **Aromatic spirits of ammonia.**		1- to 2-oz. bottle.
For shock—dissolve 1 teaspoonful salt and ½ teaspoonful baking soda in 1 quart water. Have patient drink as much as he will. Don't give to unconscious person or semiconscious person. If using substitutes dissolve six 10-gr. sodium chloride tablets and six 5-gr. sodium bicarbonate (or sodium citrate) tablets in 1 qt. water.	3. **Table salt.**	Sodium chloride tablets, 10 gr., 50 tablets in bottle.	1 box.
	4. **Baking soda.**	Sodium bicarbonate or sodium citrate tablets, 5 gr., 50 tablets in bottle.	8- to 10-oz. box.
For a sling; as a cover; for a dressing.	5. **Triangular bandage,** folded, 37 by 37 by 52 in., with 2 safety pins.	Muslin or other strong material. Cut to exact dimensions. Fold and wrap each bandage and 2 safety pins separately in paper.	4 bandages.
For open wounds or for dry dressings for burns. These are packaged sterile.	6. **Two medium first aid dressings,** folded, sterile with gauze enclosed cotton pads, 8 in. by 7½ in. Packaged with muslin bandage and 4 safety pins.	a) Two emergency dressings 8 in. by 7½ in., in glassine bags, sterilized. One roller bandage, 2 in. by 10 yds. b) Four large sanitary napkins, wrapped separately and sterilized. One roller bandage, 2 in. by 10 yds.	As indicated.

For open wounds or for dry dressings for burns. These are packaged sterile.	7. **Two small first aid dressings,** folded, sterile with gauze enclosed cotton pads and gauze bandage, 4 in. by 7 in.	Twelve sterile gauze pads in individual packages, 3 in. by 3 in. One roller bandage, 1 in. by 10 yds.	As indicated.
For eyes irritated by dust, smoke, or fumes. Use 2 drops in each eye. Apply cold compresses every 20 minutes if possible.	8. **Eye drops.**	Bland eye drops sold by druggists under various trade names.	½-to 1-oz bottle with dropper.
For splinting broken fingers or other small bones and for stirring solutions.	9. **Twelve tongue blades, wooden.**	Shingles, pieces of orange crate, or other light wood cut to approximately 1½ in. by 6 in.	As indicated.
For purifying water when it cannot be boiled. (Radioactive contamination cannot be neutralized or removed by boiling or by disinfectants.)	10. **Water purification tablets** Iodine (trade names—Globaline, Bursoline, Potable Aqua) Chlorine (trade name—Halazone).	Tincture of iodine or iodine solution (3 drops per quart of water). Household bleach (approx. 5% available chlorine) 3 drops per quart of water.	Tablets—Bottle of 50 or 100. Liquid—One small bottle.
For bandages or dressings: Old soft towels and sheets are best. Cut in sizes necessary to cover wounds. Towels are burn dressings. Place over burns and fasten with triangular bandage or strips of sheet. Towels and sheets should be laundered, ironed, and packaged in heavy paper. Relaunder every 3 months.	11. **Large bath towels.**		2.
	12. **Small bath towels.**		2.
	13. **Bed sheet.**		1.
For administering stimulants and liquids.	14. **Paper drinking cups.**		25 to 50.
Electric lights may go out. Wrap batteries separately in moistureproof covering. Don't keep in flashlight.	15. **Flashlight.**		1.
	16. **Flashlight batteries.**		3.
For holding bandages in place.	17. **Safety pins, 1½ in. long.**		12 to 15.

For cutting bandages and dressings, or for removing clothing from injured body surface.	18. Razor blades, single edge.	Sharp knife or scissors.	3.
For cleansing skin.	19. Toilet soap.	Any mild soap.	1 bar.
For measuring or stirring solutions.	20. Measuring spoons.	Inexpensive plastic or metal.	1 set.
For splinting broken arms or legs.	21. Twelve splints, plastic or wooden, ⅛ to 1¼ in. thick, 3½ in. wide by 12 to 15 in. long.	A 40-page newspaper folded to dimensions, pieces of orange crate sidings, or shingles cut to size.	As indicated.

Quantities are for a family of four or less. Assemble, wrap, in moisture-proof covering and place in an easily carried box. Place a copy of this *Family Survival Handbook* in the box for ready reference, and store the entire kit in your shelter area.

HERE IS WHAT YOU NEED FOR AN EMERGENCY FOOD SUPPLY

To estimate how much food you should buy for *your* family's seven-day home food storage, multiply the number of people in your household by the amounts listed below. Amounts listed below are for one person for seven days. If the children are young, the amounts can be decreased by one-fourth. If the children are infants, canned baby foods should be substituted for some of the other canned foods. Be sure to plan for old people or invalids.

Check "Pantry" at least once a month, preferably more often, and rotate regularly—bottled water must be changed every six weeks.

MILK: Powdered nonfat dry, one pkg.; evaporated, two (14½-oz.) cans

JUICES: Tomato, one (1 qt. 14-oz.) can; Orange, one (1 qt. 14-oz.) can; Grapefruit, one (1 qt. 14-oz.) can

FRUITS: Peaches, one (1 lb. 14-oz.) can; Pears, one (1 lb. 14-oz.) can; Dried prunes or apricots, one pound

VEGETABLES: Tomatoes, two (16-oz.) cans; Peas, two (16-17 oz.) cans; Corn, one (12-16½-oz.) can; Green beans, one (15½-oz.) can

SOUPS: Assorted, four (10½-oz.) cans

MEAT AND MEAT SUBSTITUTES: Beef stew, one (1-lb.) can; Salmon, one (1-lb.) can, or Tuna, two (6-7-oz.) cans; Spaghetti and Meat balls, one (15½-oz.) can; Baked beans, one (1-lb.) can; Cheese, one small jar; Peanut butter, one small jar

CEREALS: Ready-to-eat, seven individual serving packages

CRACKERS—COOKIES: one box

BEVERAGES: Instant coffee, one (2-oz.) jar, or instant tea, one (1-oz.) jar, or instant cocoa, one (1-lb.) package

SOFT DRINKS: twelve bottles

SHELTER CHECKLIST

Food and Cooking Equipment

Water (2-week supply, a minimum of seven gal. per person)
Food (2-week supply, see page 291)
Eating utensils
Paper plates, cups and napkins (2-week supply)
Openers for cans and bottles
Pocket knife
Special foods for babies and the sick

Supplies and Equipment for Sanitation

Can for garbage (20-gallon)
Covered pail for toilet purposes
Can for human wastes (10-gallon)
Toilet tissue, paper towels, sanitary napkins, disposable diapers, ordinary and waterless soap.
Grocery bags, newspapers for soil bags
Household chlorine (2 pt.) and DDT (1 qt. of 5% solution)
Waterproof gloves

Shelter Equipment

Battery radio with CONELRAD frequencies (640 or 1240) marked, and spare batteries for 2-week operation
Home use radiation meters, when available
Flashlights, electric lantern, and spare batteries for 2 weeks
Candles and holders
Clothing
Bedding (rubber sheeting and special equipment for the sick)
A First Aid Kit and supplies (See page 290)
Writing material (you may want to keep a diary, too)
Reading material
Screwdriver, pliers, and other household tools
Games and amusements for the children
Optional supplies: candy, gum, tobacco

Items Outside the Shelter but Within Reach

Cooking equipment (canned heat, or camp stove) and matches

Home fire-fighting equipment
Rescue tools

WHAT TO DO TO PREPARE FOR PERSONAL SURVIVAL

1. Learn your local Air-Raid Warning signals, and if your community has an evacuation plan learn the evacuation routes. See Chapter 3, also chart on last page.
2. Build and equip a shelter against nuclear attack and fallout. If you live within 25 miles of an assumed aiming point for enemy missiles, this is a must! Beyond that distance it is still highly advisable.
3. Prepare an Emergency First Aid Kit for your home for use in peace or war. See Appendix C.
4. Take a Red Cross First Aid or Home Nursing course. (Contact your CD Director or local Red Cross Chapter).
5. Train your family in emergency life-saving measures. Refer again to Chapter 5.
6. Learn to prevent and fight fires in the home. Re-read Chapter 4.
7. Learn to protect yourself against germ and biological warfare. See Chapter 7 if you farm, refer also to Chapter 11.
8. Learn emergency sanitation measures, spelled out in Chapter 6.
9. Get a radio, preferably battery-operated, and keep it in a safe place. Mark the CONELRAD frequencies, 640 and 1240 on the standard AM dial. Civil defense news and instructions will be provided at these frequencies. Re-read Chapter 3, from page 49 on; also section on Radio Equipment, page 160.
10. Maintain emergency supplies of food and water. See Chapter 6.
11. Keep your car ready for safe evacuation.
12. Get official CD identification tags. (Ask your CD warden or director.)

REVISED CIVIL DEFENSE

Air Raid Instructions

Published by the Federal Civil Defense Administration

ALERT SIGNAL

A steady blast of 3 to 5 minutes on sirens, whistles, horns, or similar devices.

WHAT TO DO

Tune your AM radio to a Conelrad station (640 or 1240 kc) for emergency instructions.

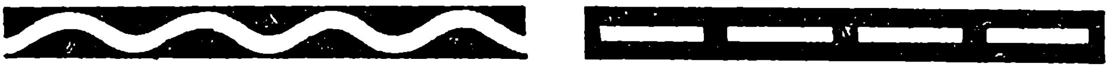
Know your local civil defense emergency plans. Obey police and civil defense instructions.

DO NOT USE THE TELEPHONE.

Do not become panicky if your radio is silent for a short time. This is necessary to switch to emergency broadcasting frequencies.

TAKE COVER SIGNAL

Wailing tone or short blasts



for 3 minutes on sirens, whistles, horns, or similar devices.

WHAT TO DO

At Home: Get into your home shelter immediately.

If you have none, shut all outside doors and windows and take cover in the basement or an interior first-floor room.

Outdoors: Seek the best available cover.

Stay Put until you get word to come out.

Important: If you see a bright flash of light, take cover instantly.

640—REMEMBER CONELRAD IS THE KEY—1240

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